

EARTHS,

Not ductile; mostly indissoluble in Water or Oils; and which preserve their Constitutions in a strong Heat. Specific gravity to Water less than 5 to 1.

Constitution and Uses.			Sp. Gr.	Affinities.	Texture and Figure.	Peculiar Qualities.	Colour.	Denominations.	
100 Parts contain	Earth - 55 Aerial Acid 34 Water - 11	2.720		AIR ATMOSPHERIC—does not affect it (1) till burnt; but the Calx then attracts moisture, which increases its weight $\frac{1}{2}$ or $\frac{3}{4}$; and reduces it to (2) powder; when it loses its disposition for humidity.	LOOSE Powdery		White Red Yellow White	CALX. Agaricus Mineralis. Lac Lunæ (improper) Ghur, when in clefts. CHALK.	
1 Tun Wt. Cryst. Spar produces of Lime	Cr. gr. lb. 11.0.1 2.701 11.1.22 2.680 11.1.9 2.657 11.1.4 2.461 11.1.4 $\frac{1}{2}$ 2.661			WATER—680 times it's wt. dissolves it; generating heat, and a pungent smell. A Pellicle collects on the surface, and sinks in form of scales. Added to the Earth, after being burnt (Lime) causes it to swell and crack, with a hissing noise, by the expulsion of the Atmosph. Air, and to fall into (3) Powder; increasing the original weight. Their attraction is so great as to make them inseparable, except by a very strong fire, which restores the E. to its calcined state. In this powdery form it no longer attracts humidity, or excites heat by their mixture, but is in part dissolved.	FRIABLE & COHERENT INDURATED		White White-yellow, red-brown,	Chalk-Stone.	
CALC. EARTH is obtained pure by boiling select pieces of powdered Chalk repeatedly in pure Water, which dissolves any Saline Matter. To free it from a little heterogenous matter which may remain, it is to be dissolved in Vinegar (an Acid not sufficiently strong to expell the Aerial) precipitated with Vol. Alk. washed and dried.				HEAT—even in that degree which fuses Iron, will not melt it <i>per se</i> ; but, by burning, expels the Aer. Acid and Water, by which it is deprived of 45 per Ct. Wt. rendering it friable, acid, corrosive, deliquescent, capable of augmenting the causticity of fixed Alkali; and of making (4) Cement, mixed with Sand.	Solid Granulated..... Sealed	Invifib. Partic. Course and Loose Course & loose Fine..... Very fine..... Course..... Small..... Fine, glittering.....	White Grey, variegated, black..... Red, yellow, white. Opaque S. Transparent White with green or black. White, red-yellow. White..... White and many coloured	MARBLES. (1) LIME. (1) Rocks or Quick. (2) Powdered. (3) Slaked. (4) (a) MORTAR.	
Crude LIMESTONE is used in making Hearths for Iron Furnaces: the Scaly is best; and some of the Grained next.				BOR. MICR. SALT, or CALCES of LEAD—being added, they melt without effervescence into a transparent colourless Glass. The transparency is permanent only if the Bead is cast into melted Tallow, or warm Water, whilst hot. EARTHS, even such as are infusible <i>per se</i> , are rendered fusible by mixture with this E. regarding the following order of affinity: 1st, Calx of Iron; 2d, Argill; 3d, Magn. and 4th, Silic. And, when this has acted upon any one species, the compound is a more powerful Menstruum.	Sparry	Rhomboidal { Foliated..... Hexag. truncated..... Pyram. Octaed. Base..... Drufen.....	Transparent { Opaque Common & Phosph. { White. Yellow.	White, black-brown, yellow.	
Crude or Burnt is employed in smelting Pyritaceous Ores: not as a Flux, for which it is ill qualified from its infusibility, but to separate from them the Sulphur (the Hepar resulting from this combination being too weak to injure the metal) and, by opposing the extreme tenuity of the Slag, prevent its running out at the tap-hole along with the metal.				METAL. CALCES—viz. of LEAD, BISMUTH, COPPER, and IRON, are reduced by it, when they contain Aer. Acid—hence it is called (5) Alkaline Earth.	Crytallized.....			Dog's Teeth. Crystal Balls. Pea Stone.	
A Cambridge Lime-kiln, in form of an inverted Cone, the diameter of whose base is 10 feet, and altitude about 14, burns about 150 bushels of Lime from Chalk, every 24 hours; consuming one bushel of Coals for every four of Lime. The segment of an Egg in the direction of its axis is a better figure.				ACIDS—dissolve it, in a crude state with effervescence; expelling the Aerial, unless that is of superior strength: but, without effervescence, if the Aer. Acid has been expelled by Fire; producing 250°. of heat from a centenary.	Stalactical { Scaly and fine Sparry and solid	Globular Conical, hollow..... Indeterm. figure..... Conic. coher. hollow..... Conical, hollow..... Radiated.....	White Grey..... White..... S. transparent..... White..... White.....	Pisolithe, Duckstein. Sinter.	
Quick Lime and Water, mixed in a globular form, concrete into a very hard substance, from it's equal contraction; and in (a) MORTAR, the Lime cements together the particles of Sand, which is incapable of contraction.				VIT.—forms with it Gypsum, and Selenitical Crystals. NIT.—(6) a deliques. Salt which, evaporated to dryness, calcined yellow, and exposed to the light for some time, gives illumination in the dark. MUR.—(7) a Precipitate with like qualities. PHOSP.—Earth of Bones, Hair, Nails, &c. FLUOR—the sparry Fluor. ACET.—a nondeliq. Salt.				(8) Caustic Alkali.	
				ALK.—does not affect the crude Calx, but precipitates Lime; which quality it communicates to crude E. Is separated by Lime from Sal. Am. in vapour, by the assistance of heat: (8) mixed with Lime, unites with it's acid: acquires a stronger attraction for Water than it had before, and is more corrosive.					
				LIME—has the alkaline quality of changing blue veg. tinctures to green.					
				SULPHUR—is dissolved by Lime, & a weak Hepar formed; but decomposed on adding any Acid.					
100 Parts contain	Earth - 32 Acid - 46 Water - 22	1.870 to 2.320		WATER—500 warm, boiling 450 times it's weight, dissolves it.	LOOSE & FRIABLE INDURATED		White White..... Yellow White Yellow, greyish White Colourless, yellowish Colourless, white, yel. White-yellow..... Yellow, white..... White and yellow White.....	GYPSUM. Ghur. (6) ALABASTER. (Plaster, see N. Salts, E. Basis) (c) Plaster of Paris. Plaster Stone, Parget. Selenite, Glacies Marine.	
A cub. foot of Derbyshire Plaster Stone weighs at a medium	Oz. 2286	2.720		HEAT—in a deg. below ignition, qualifies it, when reduced to powder, to form with Water a tenacious Paste, that soon grows hard; but in a higher degree destroys this property, depriving it of 4 to 6 per Ct. Wt. Melts the fibrous kinds easily.	Scaly Fibrous..... Sparry Crytallized..... Stallact.....				
Watricle	2286	2.720		BOR.—melted with a small quantity of Gypsum, produces a colourless transparent Glass; and, with some of the sparry kinds, a yellow colour resembling Topaz. If too much Gypsum is used the Glass will be opaque.					
SPRINGS, at the heat of 41°. may contain, dissolved in them, 1000 of Plaster-Stone.				INFLAMMABLE MATTER being added, a sulphureous smell is produced.					
(b) ALABASTER proved by the application of Muriatic Acid, which will excite effervescence if it is not Alabafter, or is of an imperfect kind.				ALK. FIXED—also decomposes it, if added in proportion of 5 or 6 to 1. The Calx produced in either of these instances contains some Iron.					
(c) Plaster of Paris (see N. Salts, basis of E.)				ACIDS—do not excite effervescence with it, either crude or calcined; unless it is not sufficiently saturated with the Vit. Acid.					
The material of which Fish Shells are made:				WATER—is attracted by it from the Atmosphere	INDURATED				
Resembles Spar only in its glossy surfaces; being less regular.				HEAT—below ignition renders it phosphorescent; calcines it with a crackling noise; and, in a high degree, melts it <i>per se</i> . BORAX or MICR. SALT.—produce no ebullition. EARTH CALC.—forms a Glass so corrosive as to melt the crucible, unless Quartz, or some apyrous Earth is added. GYPSUM—produces a Bead with Facets.	Solid, cracked Sparry, glossy Crytallized	Indetermined Fig. Irreg. surfaces..... Irregular Cubical Polyg. spherical..... Octaedral.....	S. Transparent White, dull. White, blue, violet, yellow, green, deep or pale. White, blue, red. Yellow, violet. White, blue. Colourless.	FLUOR,	
Is not hard enough to strike fire with steel.				ACIDS—MIN. particularly VITR.—in a boiling state, dissolve most kinds without effervescence; expelling the Fluor Acid.					
Useful in promoting the fusion of refractory Ores, and is therefore valued by the Smelters as Borax is by Assayers.				ALK.—even cold, will precipitate these solutions.					
Resembles garnet, and is sometimes mistaken for white Crystals of Tin.	3,600			HEAT—reduces it with great difficulty <i>per se</i> . In calcination some become red.	INDURATED				
Is distinguished by the yellow colour of its sol. the powder being digested over the fire with Mur. Ac.				ALK. or BORAX added, effects it with less difficulty: but MICR. SALT easily melts it into a black Slag.	Solid Spathose	Fine grained Unctuous surf.	Reddish, yellow, flesh-col. White, pearl-coloured.	TUNGSTEN.	
ACIDS—do not dissolve it. Digested with MUR. the Sol. receives a fine yellow colour.				HEAT—even by rubbing, excites from it a foetid smell. In distillation the Oil only soils the Glass; being in too small quantity to be obtained. In an open Fire the colour is lost by the drying of the Petrol.					
These are more or less dark in proportion to the quantity of petrol contained.				ACIDS—dissolve it with effervescence: the VIT. usually turning it brown.					
(d) MARLE—I OZ. dissolved gradually in diluted Mur. Acid till effervescence ceases, filtered with addition of W. till insipid; the weight of the dried Res ^m . subtracted from the oz. gives the weight of CALX remaining in the Sol.				WATER—imbibed by it in a calcined state, reduces it to powder.	Solid..... Granular Scaly, coarse, fine, Glittering Sparry Crytallized	Invifible Partic. Black-brown. Black, light-br. white, yellow.		MILD CALC. EARTH. Fætid, or Swine Stone or Spar.	
				HEAT—hardens it in proportion as the Clay exceeds the Calx, and easily melts it (<i>per se</i> , or mixed with the most refractory Clay) into a Glass.	Loose & COMPACT S. INDURATED		Red-brown, pale-red Grey, red	(c) MARLE, when containing Argill.	
				NITRE—does not detonate with, but decomposes it.	INDURATED				
				ACIDS—make an effervescence with it when crude, but not when burnt.	Loose Continued Strata	White Grey	Lodus Helmontii Stone-Marle.		

PONDEROUS COMBINED WITH MAGNESIAN EARTHS

METAL SUBST. IRON	(e) CEMENT for FURNACES requiring some Phlog. & no acid, should not be of Earth in which Iron is too much in a metallic state, or too much calcined. Clinkers of a forge, with Lime and Sand, are a proper compound. Puzzolanian E. (See Volcanic Prod.)		NITRE—does not detonate with, but decomposes it. AIR—changes its colour, naturally white, at least when broken, to black. HEAT—calcining it makes it black; and by expelling the Water and some Vit. Acid, reduces its weight 30 or 40 per Ct. melts it easier than it does any other Iron ores. ACIDS—do not excite effervescence with it, if rich in Metal, or containing Vit. Acid.		LOOSE Black, dark-brown White spar-like Iron Ore. They become white when powdered. (d) Cement.	
	COPPER		ACID NIT.—dissolves it with effervescence, as it contains little Metal.		INDURATED Red Light-brown.	
—CALX	United with pure Calc. Earth		ACID VIT.—has made green the blue colour which the union of the Alk. E. with the Copper, must have naturally assumed.		INDURATED S. Transp. Green Mountain blue. Armenian Stone. Turquoise. Malachites.	
	LEAD-CALX Contains about 40 per Ct. of Lead.		ACIDS—effervesce with this; distinguishing it from other Lead Ores, and sparlike Lead Ores.		LOOSE & FRIABLE White Lead Ocre, Sparlike Lead Ore.	
PURE	100 Parts contain Earth - - - 65 3.773 Aer. Acid - - - 7 Water - - - 28 Obtained by burning for an hour Pond. Spar, or Marmor Metallicum, in powder, mixed with equal parts fixed Alkali and Charcoal, adding Nitre or diluted Mur. Acid to this, again powdered, till after effervescence ceases; and precipitating the E. from the Solution with mild fixed Alkali. This is the heaviest of all the pure Earths.		WATER—1550 times its weight required to dissolve it, whilst united with Aer. Acid; especially if the Water is also impregnated with the Acid. De-priv'd of this by calcination, 900 times of boiling W. is sufficient (the contrary happens to Calc. Earth). The solution, exposed to air, collects a Cremor like that of Lime Water; and like it changes the vegetable colours. HEAT—does not vitrify it when pure, and unmixed with Acid or Alkali. ACID VIT.—forms with it a (1) Spar insoluble in Water. NIT. or MUR.—CRYSTALS barely soluble. ACETOUS—deliquescent ones. (These three have a contrary property with the Calc. E.) AERIAL—is expelled from it by the stronger Acids, with effervescence. ALK. VEG. and CALC. EARTH, combined with Vit. Acid—are separated by the POND. E. but this, combined with the SAC. ACID, is precipitated by Calcareous E. CAUSTIC—precipitates it from Nit. and Mur. Acid, by taking up the excess of Acid required to keep it in Solution. VOL. CAUSTIC—is expelled by it from Amm. Salts. SULPHUR—produces with it an Hepar, whose solution in Water is imperfectly decomposed by Nit. or Mur. A., from its attraction to the Acid of Sulphur.		INDURATED Chalk-like BAROTE, BARITES. Cauk. Calc. (1) Ponderous Spar.	
	ACID OF AIR. 100 Parts contain Pond. Earth - 78.6 4.338 Aer. Acid 20.8 - Vit. Barrofenite 0.6		HEAT—is not capable of burning it to Lime; as it melts rather than loose its acid.		Hard Radiates from the cent. S. Transparent Alum-like Aerated Barrytes.	
VITRIOL	100 Parts contain - Pond. E. - 84 4.500 Strong Acid 13—Water 3 (f) Baldwin's Phosf. 4 Nit. A.—1 Spar; after solution dried in the air, and then on fire, till red hot. This Spar is nearly as heavy as Tin or Iron.		HEAT—does not reduce it to Plaster, as it does Calc. Gypsum; nor melt it. ACID ACET.—decomposes; by dissolving it after an hour's calcination with $\frac{1}{2}$ its weight of Charcoal; by which the Sulphur of the Coal and Vit. Acid is dissipated. METAL. SUBST.—IRON alone, in very small quantity, exists in them; for they abound in Phosphorus which Gypsums can yield only, when Metallic Particles predominate.		INDURATED Transp. Phosph. Bononian Stone. Sparry Opaque White Marmor metallorum. Drufen Cock'scomb-like. S. Transparent White, reddish Pond. Drufen-Spar. (f) Baldwin's Phosph.	
	PHLOGISTON AND VITRIOL 100 Parts contain Barofel. 33—Silex 38—Alum 17—Gypsum 7—Min. Oil 5		HEAT—does not convert it to Lime, but into a sort of Plaster of Paris. ACIDS—do not excite effervescence with it.		COMPACT Course Whitish-yellow Liver-Stone. Scaly Fine, like Kernals glittering Black Lapis Hepaticus.	
PURE	100 Parts (from Epfom Salt) contains Earth - 45 2.155 Fixed Air 25—Water 30 (g) MAGNESIA ALBA—equal parts Epfom Salt and Pearl Ash dissolved in distilled Water and filtered separately; mixed and boiled briskly, adding hot Water; stir, and pour it quickly into a jar; the Precip. to be washed till tasteless. The Aerial Acid, as well as the Water, may be expelled by calcination. Obtained also from the Res ^d . left after distilling Mur. Acid.		WATER—7692 its weight totally dissolves it, with little heat and no effervescence: gives $\frac{1}{100}$ weight to the Earth steeped and dried; or $\frac{1}{100}$ if the Earth is saturated with Aer. Acid (contrary to their effects on Calc. E.) HEAT—of any degree does not affect it per se. BORAX, or MICR. SALT, or CALX, SILEX and ARGILL mixed; or ARGILL alone, melts it; and 4 its weight of green Glafs added, produces a hard Poreclain. But none of these (Argill excepted) or of Glafs of Lead, Alk. of Tartar, or Vit ^d . Tartar, added separately, will melt it. FIXED ALK. calcined with it, does not become Caustic. (Not so with Calc. Earth.) ACIDS—do not excite effervescence with it. VIT.—produces Crystals, bitter and soluble in W. (unlike those it forms with Calx) but does not precipitate it from other Acids, as it does Calc. E. NIT.—Deliq. Salts. MUR. and ACET.—not Crystals, (as Calc. E. does) but a Deliq. Mafs; and FLUOR—Hexag. Prisms, terminated by two low Pyramids of three Rhombs each.		White (g) MAGNESIA ALBA.	
	ACID—Vitriolic-Muriatic, Aerial, forms bitter Salts				Epfom Salts:	
SILICEOUS	Contains equal parts Magn. and Silex. Is capable of a fine polish. With Calx, Iron, Petrefactions and Clay—Without Clay. Used in Pottery Magn. $\frac{1}{2}$ with Clay, Talc, and Iron		WATER—does not effect its solution or cohesion—they bake into a porous mass. HEAT—moderate, hardens it; and it does not then effervesce with Acids.		COMPACT Soapy White, yellow French Chalk. Red and white Soap-Earth. Blue Olive-colour Fine Potters' Earth. Greasy Greenish-yellow.	
	STEATITES 100 Parts contain Magn. - - - 17.1 2.433 Argill. 2—Silex 80—Iron Calx 0.9 The Iron S. phlogistified - - - 2.780		WATER—does not easily diffuse, or render it ductile. HEAT—hardens and whitens, but does not melt this per se. ALK. MIN. & MUR. SALT melt with it imperfectly—BORAX more perfect. ACIDS—dissolve it slowly and partially, without effervescence.		SOLID, compact White, light-green Soap-Rock. Deep-green, yellow	
SERPENTINE STONE	100 Parts cont. Magn. 33—Silex 41 2.409 Argill. 10—Iron 4—Water 12 2.650 With Clay and Iron, an some Calc. Matter. With Steatites and Mica		HEAT—moderate, hardens; extreme, melts it, corroding the crucible. ACIDS—dissolve it partially, without effervescence. HEAT—has little effect on these, the Iron rendering them refractory		HARD, Fibrous Visible Partic Green, deep, light Serpentine Stone. Fine grained Black, green, red Lapis Ollaris. Blue, white, mixed, &c. German W. Clinkers. Diffusible in W. Red Martial Soap E. Indurated Black, red Mart. Soap Rock. Grey, white-yellow, greens Telgstein. Gneis.	
	MICACEOUS AND TALC. PURE 100 Parts contain Magn. 20—Silex 38 2.535 Argill. 28—Dephlog. Calx of Iron 14 3.000 100 P ^{ts} . Muscov. Glafs-Mag. 45—Silex 50—Arg. 5 2.913		HEAT—destroys the flexibility of their Leaves, splits them; and, being increased, causes them to curl; indicating a step towards fusion; but, in the highest degree, is scarce able to vitrify them per se: whence they have obtained the distinction of Apyrous. ALK. BORAX, or MICR. SALT—render them very fusible. With the two last they are brought into Glafs.		INDURATED Large parall. plates } Transp. Colourless MICA. TALC. Muscovy Glafs. Daze, glimmer, glist. Apyrous Earth.	
MARTIAL	Cont ^d . 12 per Ct. more Iron. Whence its colours 2.720 Is employed in the purification of com. Salt, or Nitre: and in the distillation of Mur. Acid.		HEAT—calcining it produces a yellow colour, and melts some kinds per se. AQ. REG.—dissolves it, and detects the Iron.		INDUR. { Scaly Fine, minute S. transp. Varieg. br. gr. deep or light Venetian Talc. Twisted Allum-like Light-green Talc-Cubes. Chaffy. Crystallized Concent. Scales or Hexag. Plates.	
	ASBESTUS AND AMIANTUS Contains Magn. with a greater quantity of Silex, and less of Calx and Argill. contaminated with some Iron. Contains, besides the above, some Barytes The Scythians are said to have dressed their dead bodies, which were to be burnt, in Cloth of this Stone.		HEAT—has little effect upon these; the martial kinds excepted. FIXED ALK. or BORAX—easily promote their fusion. ACIDS—do not affect them; nor do they strike fire with steel.		INDURATED { Parall. { Pure White ASBESTUS. AMIANTUS. Martial Yellow-brown Mountain Leather. Twisted { Pure White Mount. Cork. Martial Yellow-brown Mart. brittle Light-green, white Earth, Flax. Broken { Martial Greenish Light-green	

QUARTZ.

OPAL

HEAT—deprives it of colour and transparency, and, with **BORAX**, melts it; does not melt the crust *per se*; but, with the addition of **BORAX**, fuses it without effervescence; dissolving $\frac{1}{2}$ it's own bulk, and producing a Glass, clear and colourless; not *white and opaque like that produced from Calc. Earth*.
ACID. NIT.—does not dissolve it.

Hard.....	{	Opaque	Olave by reflection.	OPAL of Nonnius, or Sangenon.		
		Transparent	Ruby seen by refraction.			
		Glass-like	Transparent	White-ground, whence pro- ceed green, yellow, purple, and blue rays; which be- come red on being held to the light.	White Opal.	
		Spotted or streaked	{	Opaque.....	Many coloured.....	Oriental Opal.
				S. transparent.....	Milky	Pseudo Agate,
			Bluish.			

Red Ruby, Oriental.....	Argill.	40	Silex	40	Calx	9	Iron	11
Blue Sapphire, Oriental		58		35		5		2
Yellow Topaz, Saxon		46		39		8		7
Green Emerald, Orient		60		24		10		6
Yellow-brown Hyacinth		42		25		20		13
Tourmaline....Ceylon		39		37		15		9
	Brazil.....	50		34		11		5
	Tyrol.....	42		40		12		6
Garnet, Bohemia		31		48		11		10
Cryoprase, Siberia				04½		2½		0

Copper.
Magan.

201343

HEAT—by calcining, renders it opaque, white, and milky. With POT-ASH produces a better Glaze than Jasper does, but not so good as that from Quartz.

..... Form of black Calx Black, glossy.
..... of red Calx Red (1) *Flint Glossy*. (See Alk. fixed)

VITRESCENT EARTH.
Flinty Earth.

...DIAMOND. Proper.
 } Diamonds.
 ...Jargon.

...Oriental.

Adamantine, or Grinding
Spar.

..Carbuncle
..Spinell
..Balafs
..Rubicell

} RUBY.

...SAPPHIRE, proper.
...White sapphire.

ТОРАЗ, proper.

...Chrysoprase } Crysolite
...Aventurine }
...Prase }
...Beryl, proper } Beryl.
...Aq. Marina }

...EMERALD, proper:

..HYACINTH. Jacinth.
..Crysolectre.

...AMETHYSTE. Oriental.
... Occidental.

..Syrian GARNET.
..Soranus. Vermeille.
..Occidental Garnet.

..ASH-DRAWER, or Tourma-
line.

OPAL of Nonnius, or
Sangenon.
White Opal.

...Oriental Opal.
...Pseudo Agate.

(1) *Flint Glass*. (See Alk. fixed

FLINT.

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PURE between Quartz and Jasper. Shows marks of having been in a soft state.			AIR—acts this more than it does Quartz, but less than it does Jasper. HEAT—by calcining, renders it opaque, white, and milky. With Pot-Ash produces a better Glass than Jasper does; but not so good as that from Quartz.	Solid more uniformly than Quartz.	Scaly fracture Lamellar Crypt. encl. Quartz	More transparent than Jasper.	FLINT		
COMBINED									
JADE	{ Of unctuous feel, denoting Argill. or Magn.	2.970 3.389	HEAT—of the furnace does not harden it; but the collected rays of the Sun produce a green Glass.	Very hard	Granular	S. transparent	{ Whitish, greenish, green Grey, yellowish, yellow	LAPIS NEPHRITICUS. Jude. Circumcision Stone.	
Cat's Eye	Very scarce.	1.700 to 2.240	STEEL—does not strike fire with it	Hard		Opaque	Reflects green and yellow	PSEUDOPALUS, Cat's-Eye.	
Oculus Mundi	{ In Water exhales a musty smell. Admits of cutting, and a polish.	2.048	WATER—particularly when hot; and, still more quickly, diluted Acid or Alk. by infusion, gives it transparency, having imbibed a part. It gradually re-assumes opacity as it dries. HEAT—does not melt it <i>per se</i> ; but, excited, renders it brown and brittle. Strikes fire with steel.	Hard		Opaque	{ Whitish-brown Yellow, ruby or pearl-colour when wet.	HYDROPHANES. Iris. Oculus Mundi.	
CHALCEDONY									
White Agate	{ Receives a good polish. Is usually cut cabochon, (i. e.) with a convex surface.		HEAT—in a high degree vitrifies it <i>per se</i>	Harder than Agate Less hard than Onyx	Veined and Spotted	{ Opaque S. transparent	{ Whitish White, bluish-grey Grey, bluish-brown	Chalcolong Hydropal	
Moon-Stone	Reflects light, with Pearl and Carnation Col.			Hard	Foliated fracture		Blue-white, milky	Rainbow Stone. Iris.	
Onyx	Fig. in relief (Camei) may be cut thereon	2.500 2.600	HEAT—deprives it of colour; and, if suddenly applied, cracks it.	Hardest of Flints	{ Parallel, straight, or curved lines		{ White lines. Black and white	Oriental Onyx.	
CARNELION	Looks like Amber or Flesh,	2.630 to 2.700	HEAT—discharges the colour	Less hard than Chalcedony			Reddish, high-col. yellowish.	CARNELION.	
SARDONIX	Cameos cut thereon, as on Onyx.	2.630 2.700	HEAT—discharges the colour	Mixture of Calcedony and Carnelian.	Stratumwise, confused		White and Red	{ Stripes Dentils.	SARDONIX.
AGATE	{ These five kinds have no real difference between them, except some inexplicable degrees of hardness. Are used for toys, snuff boxes, seals, cameos, &c.			Hard	{ Dentrit. globular, or Nodules irregular.	{ Opaque S. transparent	{ Brown with black veins Black-brown lines Red dots, minute Calcedony-col. Orange-clouds, red, blue.	Egyptian Pebble. Mocha Stone. Sardea.	AGATE.
COMMON FLINT	{ 100 Parts contain Sil. 80—Arg. 18—Calx 2. Used for Gun-Flints.	2.650 2.700	CHALK, and WHITE LIME-STONE—are usually the matrices of Flint and Chert, in which they are embed in form of Nodules, consisting of (2) <i>Neucli</i> involved in a <i>Crust</i> .	Hard	Nodular	S. transparent	{ Black-grey, yellowish White-grey, brown	Pebbles, when small (2) <i>Flint Gall</i> .	FLINT.
CHERTS	{ Less transp. than common Flint, more than Jasper, and of fine texture.	2.590 2.700	HEAT—in calcining, whitens it with decipitation; and generally fuses it. BORAX and MICR. SALT added, it melts without effervescence. MIN. ALK. does not totally dissolve it.			S. transparent where thin	{ Flesh-coloured, white-yellow. White-greenish.	Hornstein.	CHERT.
JASPER	{ 100 Parts cont. Sil. 75—Argill. 20—Calx 5. Used for toys, and for gun Flints; differing little from com. Flint.	2.680 2.778	HEAT—melts this more easily than Flint, without cracking or loss of colour. MIN. ALKALI added, separates it into small particles with effervescence; but BORAX and MICR. SALT melt it without effervescence. Acids only corrode it, after several months.	Indurated, like dry Clay		Opaque	{ Green with red specks Green, red, yellow. Red with yellow spots. Black Red, red-brown Red-brown, Ocre-like. Liver, deep-red, yellow.	Blood-Stone Sinople	JASPER.
Combined with Iron	{ Sinople contains from 18 to 20 per cent. Iron.		MAGNET—attracts it.	Hard	{ Grained Slag-like				
PURE	{ 100 Parts contain Sil. 67—Bar. 11—Magn. 8—Argill. 14. Found in loose masses, 2 inches long, or mixed with Sand, Clay, &c. or bedded in Granite. Used in making China at Dresden.	2.400 2.600	HEAT—in a violent degree, melts it more easily than Fluors into whitish Glass, not corrosive. In a moderate degree, makes it's Crystals decipitate. FIXED ALKALI makes an impression on it; and with BORAX and MICR. SALT it is dissolved. ACIDS—separate from it Sil. Barytes, Magnesian and Argill. Earths.	Crystallized	{ Rhomb. Cubic or Parallelepiped Amorphous sometimes.		{ White, red-brown, pale-yellow, greenish	RHOMBIC QUARTZ. Felt-Spar, or Spar, Petunse of the Chinese.	
Labrador Stone.	{ Very beautiful when polished.	2.755		Hard	{ Foliated fract. Crystallized	{ Rhomb. Cub. or Par.	{ S. transparent Reflects blues and greens.	Labrador Stone.	
White Felt-Spat		3.600 to 4.400	STEEL—strikes fire with it	Solid		Opaque	White, with Ocre spots	White, Felt-Spat.	
IRON	{ Good Iron ore when cont. 12 per cent. Iron. Found small, in micaceous Stones; cuts into beads and trinkets.	2.000 3.400	HEAT—melts it the easier the less Iron it contains. KALP being added melts it to Glass, with the blow-pipe, on Charcoal (<i>unlike Flints</i> .) BORAX, or VEG. FIXED ALKALI—readily promotes it's fusion. It strikes fire with Steel.	Hard	{ Grained, coarse, unfigured Crystallized	{ Spheric. with Facets Cracked	{ Red-brown, yel. white or pale Red-yellow Red, red-br. green, yel. black.	Hyacinth	GARNET Gem.
IRON AND TIN			HEAT—sufficient to melt the Tin and Lead, separates these from the Iron; at which time they appear to sweat out from the Stone.		{ Grained, coarse Crystallized		{ Blackish-brown. Black, br. light-green, white.		
IRON AND LEAD					Crystallized		Red-brown.		
COCKLE	{ 100 Parts of some contain Sil. 55—Argill. 39—and pure CALX 6. Others from 12 to 20 of Magn. It contains also Iron, which is found in greater quantity in the opaque sorts.	3.000 3.400	HEAT—cracks it, but brings it into fusion with great difficulty. MIN. ALKALI, or MICR. SALT—are incapable of melting it AQ. FORT—does not totally dissolve it. What is dissolved may be reduced to a Jelly by adding an ALK.	Hard	{ Grained, coarse, Undeterm. Fig. Sperry Fibrous Crystallized	{ Fracture, cubical, or Rhomboidal S. transparent Parall. Fibres Concentrated Prismatical	{ Opaque Pellucid S. transparent S. transparent	{ Green Deep-green Pale-green, white, br. black, Black, green, white. Black, green, white. Black-green Light-green, white. Black, deep & light gr. brown. Red-brown	SHIRL or COCKLE. Mother of Emerald. Pine Ore. Cros-Stone.
ROWLY RAG	{ 100 P. cont. Sil. 47.5—Argill. 32.5—Iron 20.	2.748	HEAT—of an open Fire renders it magnetic. In a high degree melts it <i>per se</i> .		Granular	Numerous Crystals	Shining	Dusky or dark-grey.	
MUR. SPAR	{ 100 Parts contain Sil. 50—with Magn. and Iron.		HEAT—in a strong degree turns it brown; at last it melts <i>per se</i> . ACIDS—create an effervescence; and yet it strikes Fire with Steel.	Solid.	Sperry		Shining fract.	Grey, Ocre.	
TURKEY STONE	{ 100 Pts. cont. of Argill. 25, and no Iron. The finest-grained good Hones for Razors.		ACIDS—produce an effervescence, although it gives Fire with Steel.	Shattery			Dull-white, uneven colour	WHETSTONE. Cos.	
RAGG-STONE	Contains mild Calx, and some Iron.	2.729	ACIDS—produce an effervescence, and Steel gives Fire with it.	Lamellar or Fibrous	{ Quartz-like, coarse Grains		Grey	Coarse Whetstone.	

PURE	Adheres to the Tongue, or wet and soft bodies, in the more solid Specimens. Tenacious, ductile, and kneadable in an eminent degree.		Pure 1.305 Com. State 2.000	WATER—does not dissolve it in any sensible degree: imbibed by it in quantity a tenacious Paste is made; which moulded, and the Water again expelled by Fire, it acquires a great degree of hardness; loses its attachment to Water, and is not acted upon by Calces of Lead.		White.	CLAY.
	Obtained by dissolving Rock Allum in distilled Water; filtering and precipitating the Earth by mild Vol. Alk.			HEAT—gradually applied, contracts the Mass in proportion to the greatness of the degree, hardening it so as at length to strike Fire with Steel, which is owing to some Silic. E. contained; and it becomes full of Cracks. It does not acquire the Quality of Lime, nor is it vitrifiable <i>per se</i> . FIXED ALK. does not promote its Fusion. BORAX AND MICR. SALT dissolve it; the first with little, the latter more sensible effervescence. CALCES OF LEAD affect it less than they do Calc. E. EARTH CALC. produces with it a very ready fusion. SILIC., $\frac{1}{2}$ its weight, prevents it cracking with Heat.			
FLINT WARE.	The purest Clay being much beaten in Water, the Liquor, containing the finer parts, is passed through a Sieve of Hair or Lawn. The Clay remaining in these is well mixed with Powder of Flint (obtained by calcination, and grinding) under hard Stones, of which Chert is best) sifted in Water to the consistence of Cream, and left to set. The Mixture is then kiln dried, tempered by beating, moulded into proper forms at the Wheel, and put into Seggars, (Cases made of Common Clay perforated to admit the Vapour) which are then piled up in the Dome of the Furnace. The Fire being lighted, the Ware is brought into temper in 48 Hours. The proportions depend on the quality of the Clay; which must be ascertained by Trials; too much Flint inclines the Ware to crack; too little disqualifies it from receiving the Saline Glaze.			ACIDS—dissolve it with a little effervescence: the VIT. best, because it is easiest concentrated: this yields (1) small astringent Crystals. NIT. MUR. and VEG. form with it deliquescent Salts. SAC. is not capable of precipitating it from any of these combinations, as it does all other Earths (except the Pond. united to Vit. Acrid, and the Silic.) unless when there is an (1) Alum, excess of these Acids.			
	GLAZE, White for Com. Ware is performed by casting into the Furnace Com. Salt; the Vapour of which enters the Seggars, and attaches itself to the Surfaces of the Pieces. Yellow for Queen's-ware—The Pieces, after baking, are dipped into a Composition of 112 lb. White Lead, 24 ground Flint, and 6 Flint-glass ground, mixed together in Water to the thickness of Cream, and then again put into the Fire. The Yellowish colour may be changed, by additions of other mineral Substances to the Lead.			ALK. FIXED—dissolves it in the dry way. VOL. AND CONCRETE—added to the Solutions, unite with the Acids, and the Earth is precipitated. SULPHUR—is not dissolved by it in its pure State. Nor is SAL AMM. decomposed.			
SUGAR IS REFINED	by Clay diffused in Water to the consistence of Honey; and laded on the Sugar in the Moulds; requiring no quality but not to dry too soon. The best is got from France.			The Fire being lighted, the Ware is brought into temper in 48 Hours. The proportions depend on the quality of the Clay; which must be ascertained by Trials; too much Flint inclines the Ware to crack; too little disqualifies it from receiving the Saline Glaze.		Glaze for Wares. White. Yellow—Queen's Ware. Black.	
	WEDGEWORTH'S THERMOMETER; to measure the heat of Furnaces. Small Bricks of the purest native Clay are slightly hardened, and cut into Blocks $\frac{1}{2}$ of an Inch in breadth, $\frac{1}{4}$ deep, and 1 long. One of these placed in the Fire is soon ignited: is then taken out, cooled, and slid down an inclined Plain or Scale of Bricks 24 In. long, between two graduated Rules, meeting at one end, and $\frac{1}{2}$ of an In. asunder at the other; the degrees marked in Inches and Tenths will shew the quantity of contraction in the breadth of the Brick, which is in proportion to the deg. of Heat.					French Clay for Sugar refinery. Wedgeworth's Thermometer.	
ARGILLA AERATA	Cont. some Calx. Gyp. Iron, and fixed Air. 1.669 Found in small Cakes, which mark white.			ACIDS—produce with it effervescence..... Hard as Chalk.....Minutely crystallized.....Transparent.....Snow white.....Lac Lunæ.			
	Contains also Quartz Crystals and Mic. Vessels are made of this which resist a melting or boiling Heat, and hold Salts and Acid.			HEAT—does not deprive this of whiteness, or vitrify it, but gives it a tenacious softness without altering its figure. The fracture appears solid and shining. It strikes Fire with Steel.			
PORCELAIN CLAY.	Pure ORIENTAL CHINA—is made of Petunse [a Stone vitrifiable in a strong heat] reduced to powder; thoroughly mixed with Kaolin [an unvitifiable unctuous Clay] long exposed to the Air, and purified from Quartz; in as small a proportion as possible; moulded; varnished with the finest Particles of Soap-Earth dissolved in Water to the Consistence of Cream; and then baked.			Diffusible, Cohesive in Water. Friable.....White.....Apyrous Clay-vulgo. Kaolin of China.			
	Combined with Phlogiston, sometimes Iron. Sapid.			HEAT—strong and quickly applied renders it black internally; gradually applied, it becomes white and then Pearl coloured. Aq. Reg. boiling with, deprives it of viscosity.			
STONE-MARROW.	(a) Used in dressing Cloth; to carry off oily impurities, and thicken it, by curling up the Hairs.			HEAT—melts it into a white or redish frothy Slag; enlarging the Volume.			
	100 Parts lamell. Hornblende cont. Silic 37 Argill. 22—Magn. 16—Calx 2, both in a mild state—Iron Calx little dephlog. 23. The striated contains Sil x 65. The Whetstone contains 65 pr. Cr. Silic, and exhales an earthy smell.		2.660 3.880	HEAT—with difficulty melts those which contain most Iron, viz. the Yellow, Red, and Brown. If the quantity is 14 or 15 pr. Cr. they become Magnetic after Calcination, the Hornblende grows hard; and the black turns a Snuff colour.			
BOLE.....	The Whetstone contains 65 pr. Cr. Silic, and exhales an earthy smell.		2.664	ACIDS—do not excite effervescence; except the NIT. with the black Hornblende, when it has been heated. The Sol. assumes a greenish colour.			
	Harder than Fluors. Scratched by Steel; differs little from the Boles. The Siliceous E. predominates in these. 100 Parts of Red cont. Silic 80—Argill. 9. 5—Calx 6. 5—Water 4.			NITRE—does not detonate with it.			
ZEOLITE.....	of the White Oval, from Iceland: Silic 50—Argill. 20—Calx 8—Water 22. In general the Crystallized contain most Water, and swell in the Fire like Borax.			HEAT—melts it <i>per se</i> with ebullition into a white frothy Slag; which, in the moment of fusion, gives a phosph. light. MIN. ALK. promotes the fusion more than BORAX or MICR. SALT do; the former producing no ferment, as with Gypsum; nor the latter as it does with Lime, LAPIS LAZULI first becomes brown when melted, and then produces a clear Glass with blue Clouds. By scorification with Lead 1 Cwt. has produced 2 Oz. Silver: the Slag is of a greenish colour, given it by Iron probably.			
	Lapis Lazuli cont. Silver, and Iron which gives the blue Colour. It possesses no Copper.		2.100	ACIDS—dissolve it slowly and without effervescence. NIT. distilled with it produces Fixed and sometimes Dephlogisticated Air. VIT. deprives Lap. Lazuli of the blue colour.			
TRIPOLI.	Of volcanic production; feels gritty in the Mouth. 100 Parts cont. Silic 90—Argill. 7—Iron 3. Is employed in polishing hard Bodies.			ALK. FIXED—added to the Sol. in Vit. Acid, precipitates a white E. which scorified with Borax yields Silver. VOL.—does not give it a blue Col. containing no Copper.			
	The best for Bricks and Pottery is that which is free from Calc. E. and should be long exposed, particularly to Frost, to divide the Particles. Brick Moulds 10 In. by 5; Bricks burnt 9 by 4 $\frac{1}{2}$.			HEAT—hardens it, vitrifying the Surface; and giving a red colour to all except the English. BORAX, MICR. SALT OR CALC. EARTH promote the fusion.			
COMMON CLAY.	Pure Calc. Earth.....			ACIDS do not excite its efferv. VIT. AND MUR. are extracted from it by distillation.			
	mixed with Phlogiston, and a large quantity of Vit. Acid			HEAT—gives it a Red colour, more or less deep; or Yellowish; Melts it easily into a green Glass, in consequence of the Iron, Silic, and Vit. Acid which it contains.			
SCHISTUS	100 Parts Welsh Slate cont. Silic 46—Arg. 26—Magn. 8—Calx 4—Iron 16, partly phlog. and partly not.		2.876	HEAT—deprives it of 2 $\frac{1}{2}$ pr. Cr. weight when red hot; and, cast into Water, it forms Lime. Great heat melts it <i>per se</i> into a cellular Glass; hard enough to strike Fire with Steel. FIXED ALK. promotes the fusion. BORAX AND MICR. SALT more powerfully. NITRE detonates with it, producing a brownish red colour.			
	Writing Slate cont. more Magn. and less Iron. Sound roof-Slates give a clear sound when thin. Pyritaceous. Easy to split if the Iron is S. dephlog. Butuminous. Does not shew white when scraped.			ACIDS—effervesce slightly with it in powder. NIT. dephlog. in time gives a greenish colour.			
FLAG-STONE.	Used for Floors; some for Roofs.		2.606 to 2.780	AIR—reduces it to powder when long exposed to its action.			
	May be cut in any direction.		2.288 to 2.568	HEAT—produces from it a strong smell; sometimes sensible without heat.			
TOAD STONE.	100 Parts cont. Silic 56 to 63. 5—Argill. 15—Calc. 7. 5—Iron 16.			ACIDS—do not efferv. with this or the two following; nor do they strike Fire with Steel.			
	100 Parts cont. Silic 60—Arg. 25—Magn. 9. Iron 6.		2.630	HEAT—so little affects it, that some kinds are used for Firestones.			
KILLAS.				HEAT—in a high degree melts it <i>per se</i> ; originally of Volcanic production.			
				ACID NIT.—acquires a greenish colour from the Green, as containing most Iron.			

A P P E N D I X to E A R T H S.

SUBSTANCES which, though not belonging to the MINERAL KINGDOM, are found in Mineral Collections, and come under the Observation of Miners in the Subterranean Geography.

<div> <div> S T O N E S </div> <div> COMPOUNDED </div> </div> <div> The different Subjects being so fitted together as to leave no void Space between. </div>	<div> CONGLUTINATED </div> <div> The Particles united by cementitious Matter. </div>	<div> HOMOGENEOUS. </div> <div> GRANULES. </div>	Calc. Earth, viz. Scaly Limestone, with kernels or Bits of Serpentine Stone. The last of these receives a fine polish.					White, Green.....Kolmord Marble White, with round.....Ant. Serp. Stone —with 4 ang. pieces black Steat. Haraldfic Marble Dark-green, White Veins.....Genoa Marble	} Ophites.											
			Mica and Quartz. Employed in Furnaces, and for Millstones. Mica, Quartz, and Garnets, or Shril. The first is easily split for Millstones; the Mica Particles may be ground away with Sand.	HEAT—has little effect on these; except that the red kind cracks soon if the flat side of the Stratum, instead of the extremity, is next the fire.	Particles	{ Distinct..... Convoluted.....		White-grey, green, reddish.....	} Granitello.....Firestone.											
			Mica, Quartz and Argill. perhaps Martial. The black used for Tables, and School Slates.		Garnets	{ Distinct..... very small Garnets..... Prism. Rad. or Fibrous Cockle..... Kernels.....		Light-grey..... Dark-grey..... Dark-grey..... Pale-red.....	} Millstones.											
			Mica, with Hornblende Base. Mica, Felt-Spat and Quartz (which form the hardest Granite) mixed accidentally with Hornblende, Steatites, Garnet, and Bafaltes. They admit of a polish. Moulds are made of the friable kind to cast Bras.	HEAT—melts it so easily that it is used as a Flux for Bog Iron Ore. HEAT—of a Furnace is incapable of melting, or splitting it; the vitrifiable quality of the Silix and Quartz being restrained by the Mica. The Flame of a Blowpipe separates the different Concretions.	Particles	{ Coarse..... Fine..... Minute.....		White, light-grey..... Liver, black or light-grey, black..... Olive..... Dark-green.....	} Cos. Whetstone. Greenstone.											
			Jasper, and Felt-Spat; sometimes Mica and Bafaltes. The dark-red most employed in Sculpture. Is very hard, and difficult to work.	HEAT—melts those kinds <i>per se</i> , which have Chert for their Ground.	Loose and Friable. Compact, grained.	{ Fine—In these the Quartz transp..... Coarse..... In these the Mica (least copious) is..... the Felt-Spat..... the Shoerl.....		White, grey, violet, brown Grey, Yel. Green, red, blue White, yel. red, green, black Black generally	} Moorstone.....Granates.											
			Jasper and Clay; either of them combined with Iron. 100 parts cont. Silix 52—Arg. 15—Calx 8—Iron Calx 25. Employed in making Glais Bottles. Frequently resembles Steps. Jasper (martial) Base, with bits of Spat, Calx and Serp. Stone.	AIR—decays it a little when very long exposed to it. HEAT—in calcining cracks it when red hot; and melts it <i>per se</i> into a Black Slag. BORAX encreases the fusibility. MIN. ALK. does not entirely dissolve it.	Nodules or loose Stones.		Green with gr. felt-spar. Red with W. Black with W. & red. Reddith-brown with W. & red. Grey with W.	} Porphyry.												
			Calcareous Stones by Lime—or Shells and Corals petrified, by Calc. Cement. Marly Matter in polyg. compartments, inclosed in a Crust. Siliceous Pebbles, by Jasper, or such like Substance. Jasper Kernels, by Jasper Substance. Quartzose Kernels, by unknown Cement. Porphyry Pebbles of various Sizes, by Porphyry. Sandstone, and various other Stones variously conglutinated. Many fit for Ornaments.	HEAT—melts those kinds <i>per se</i> , which have Chert for their Ground. HEAT—in calcination gives it a magnetic power. HEAT—in calcination robs it of half its weight; and, being urged, melts it into a black Slag. ACID-NIT. produces effervescence, and a Yellow Sol.—OL. TART. per del. added generates Bubbles; from which black filaments project, and stick like Cobwebs to the Sides.	Chaffy..... Grained..... Crystallized, Polyang. Columns..... Elliptic Kernels are included.....		Dark-grey, black. Dark-grey, reddith, brown. Black, bluish, reddith..... Black, deep-brown, grey..... Red, White and green Kernels. Fruit-stone Rock.	} Trap.												
			Imperceptibly minute Mica and Quartz Some are elastic and strike Fire with Steel Mica and Silix, sometimes Spar, with greater or lesser Particles, by Clay. Used for Millstones. Larger Fragments—As Mountain Green and Pebbles—Potter's Ore with Limestone, Slate Kernels and Shells—and Marcastical Copper Ore with small Pebbles. Smaller Pieces—As Potter's Ore with Quartzose Sand—Mountain-Green with Sand—Cobalt Ore with Sand—Martial Ochre with Sand.	AIR—decays it a little when very long exposed to it. HEAT—in calcining cracks it when red hot; and melts it <i>per se</i> into a Black Slag. BORAX encreases the fusibility. MIN. ALK. does not entirely dissolve it. AIR—causes its decay. HEAT—in calcination gives it a magnetic power. HEAT—in calcination robs it of half its weight; and, being urged, melts it into a black Slag. ACID-NIT. produces effervescence, and a Yellow Sol.—OL. TART. per del. added generates Bubbles; from which black filaments project, and stick like Cobwebs to the Sides.	Globose, seldom Flat, Concave sometimes		Whitish-brown..... Whitish-yellow Crust..... Finest coloured are..... Yel. Basis, with grey Pebbles.....	} Ludi Helmontii Marbles Plumb-pudding-Stone.												
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			Calc.—The Ind. fit ornaments for Grottos; the Loofe for Lime or Manure. The Gypseous kind is not found changed. Siliceous—Changed into Flint. As Shell-formed Carnelians—Wood-formed Agate—White flinty Corroloids—and Wood to Yellow Flint of smooth lamellar texture. Argillaceous Unknown Clay.	HEAT—reduces all calcareous Petrefactions to Lime; so that their original principle is not altered by the change. Are therefore fit for Lime of Manure.	Friable..... Animal form..... Indurated to Lime..... Loofe and Friable..... Indurated.....	{ Vegetable form. Mouldered Shells..... Animal or Veget..... Limestone or Spar..... Vegetable form.		Human bodies found in Mines. Turf and Roots, in Copper Waters. Trees, fully or imperfectly saturated. Turf.	} Longbough Homes of this kind.											
<div> PETREFACTI-ONS. </div>	<div> SALINE..... </div>	<div> PHLOGISTIC..... </div>	<div> METALLIC..... </div>	<div> DECOMPOSITIONS OF </div>	<div> Mould of </div>	<div> LAVA..... </div>	<div> BASALTES..... </div>	<div> TERRA PUZZOLANA. </div>	<div> PUMICE STONE </div>	<div> SLAGS or VOLCANIC PRODUCTIONS. </div>	The Cellular cont. Sil. 45 to 50—Iron 15 to 20—Calx 4 to 5 <i>pr. Ct.</i> rem. Arg. Is only mollified. Compact—same Contents. Higher deg. of fusion. Vitreous—Silix 49—Arg. 35—Calx 4—Iron 12.	Cont. Sil. 52—Arg. 15—Calx 8—Iron 15 <i>pr. Ct.</i> The Pillars and Joints varnished with sparry Matter; and so adapted as perfectly to fill Space.	Cont. Sil. 55 to 60—Arg. 20—Calx 5 to 6—Iron 15 to 20 <i>pr. Ct.</i> —with Lime and Water.	Cont. Magn. 6 to 15 <i>pr. Ct.</i> some Calx, most Silix. Swims on W. Is used to smooth rough Surfaces.	AIR—in process of time decomposes all these Slags. They strike Fire with Steel, and are mostly magnetic. MICR. SALT has little power over the Compact kind, and the usual Fluxes attack it with difficulty. This kind gives a clear found when struck.	HEAT melts it into a black Glais of different texture from the Stone, which seems never to have been completely vitrified; but so softened as that the columnar kinds were possibly formed by the preffure, and shrinking of the Mass.	LIME $\frac{1}{2}$ and Water added, the Composition hardens suddenly. The half-baked Clay imbibing the Water accelerates the deficcation of the Calx, and the Iron hardens it.	STEEL with difficulty produces Fire from it.	Rough and porous like Frothy Slag.	Parall. Slender Fibres..... White, red-brown, grey, black, Pumice-stone,
											The Cellular cont. Sil. 45 to 50—Iron 15 to 20—Calx 4 to 5 <i>pr. Ct.</i> rem. Arg. Is only mollified. Compact—same Contents. Higher deg. of fusion. Vitreous—Silix 49—Arg. 35—Calx 4—Iron 12.	Cont. Sil. 55 to 60—Arg. 20—Calx 5 to 6—Iron 15 to 20 <i>pr. Ct.</i> —with Lime and Water.	Cont. Magn. 6 to 15 <i>pr. Ct.</i> some Calx, most Silix. Swims on W. Is used to smooth rough Surfaces.	AIR—in process of time decomposes all these Slags. They strike Fire with Steel, and are mostly magnetic. MICR. SALT has little power over the Compact kind, and the usual Fluxes attack it with difficulty. This kind gives a clear found when struck.	HEAT melts it into a black Glais of different texture from the Stone, which seems never to have been completely vitrified; but so softened as that the columnar kinds were possibly formed by the preffure, and shrinking of the Mass.	LIME $\frac{1}{2}$ and Water added, the Composition hardens suddenly. The half-baked Clay imbibing the Water accelerates the deficcation of the Calx, and the Iron hardens it.	STEEL with difficulty produces Fire from it.	Rough and porous like Frothy Slag.	Parall. Slender Fibres..... White, red-brown, grey, black, Pumice-stone,	

S A L I N E

Sapid; Soluble in Water; and capable (by various combinations between the different Kinds, or with some other Substances) of Crystallization.

A C I D S.

Sour to the Taste.
Corrosive to many Bodies.
Attractive of Alkaline Salts, and certain Earths, &c.
Effervesce during the union with Alk. matters, generating Heat; and producing Neutral Salts, Vitriols, Gypsum.

Change the expressed Blue Juices of most Vegetables to Red.
Decompose Soap; separating the Alkali from the Oil.
Volatile and subtle (such as assume the aerial Form) so as not to be observed by the Eye in a pure State.

A L K A L I E S.

Have a lixivial urinous Taste.
A vehement attraction to Acids.

Change the Blue Colours of Vegetable Tinctures Green.

MILD—in their natural State; being in combination with the Aerial-Acid.
CAUSTIC—when deprived of the Aer-Acid.

CONSTITUTION.

SP. GR.

AFFINITIES.

PRODUCTS.

CONSTITUTION.

AFFINITIES.

PRODUCTS AND CONTENTS.

PURE. In the abstract, considered as possible to exist in Nature.

DILUTED—with Water—Its general State. Colourless.

DEPHLEGMATED as far as Art is capable of: it contains

Pure Acid 426.9

Water 1698.1

Has neither colour, nor smell, when highly concentrated.

Obtained usually from Coperas (first calcining it to redness, to dissipate the elastic Vapour; and to expel the Water, without which the Iron could not be held in solution) by distillation in a long and violent Fire, the Acid passes over. The fire being urged it comes (a) black and thick, leaving a Sal. Subs.

Also from Sulphur, crude, or in Flowers—per Campana; or by inflammation in a Balloon (large Globe or Vessel) having within a Glass Pedestal, on which the Sulphur is laid. To every 32 parts of Sulph. is added 1 of Nitre, to qualify it to inflame without air, excluded by shutting the hole that admitted the Materials, which is at the top; and, has fitted to it a Valve weak enough to yield to the incoercible Vapours.

It may be obtained also from the Pyrites.

Useful—in several Medicines. In bleaching Linen, in Dyeing, and (in its volatile State) in whitening Silk, and Woollen Stuffs. Also in producing (c) Inflam. Air, by pouring it on Iron or Zinc, and diluting it greatly with Water. In this manner are Balloons inflated with inflammable Air.

4.226

2125

WATER—is greedily attracted by it; $\frac{1}{4}$ its weight in a Day, and 6 times the weight in the whole; acquiring, with the least possible quantity, an (1) *unobvious appearance*. Suddenly added in quantity, a violent heat is produced, greater than that in which Water boils (probably owing to the contraction of the Volume) and the Water, being the least fixed, flies off.

HEAT—required to rectify it, must, after the first Vapour rises, be brought to 600°.—Reduced to a degree between the 3d. and 5th causes it to freeze.

PHLOGISTON—it has the strongest attraction to, and by their union an (3) *Inflammable Substance* is formed. Being perfectly united and dephlegmated, and the Phlog. of the veg. Kingdom, a (4) *Substance* is produced which takes fire on being exposed to the Air.

ALK. { FIXED { VEG.—required to saturate 100 Gr. of this Acid.....Gr. 215

{ MIN.165

VOL.90

EARTH—CALCAREOUS.....with effervescence.....110

MAGNESIAN.....without effervescence.....80

ARGILLACEOUS.....without effervescence.....75

PONDEROSE.....without effervescence.....

METALS—MERCURY.....is only corroded by it.....432

LEAD.....412

SILVER.....390

COBALT.....360

BISMUTH.....but partially.....250 to 310

NICKEL.....320

ZINC } producing Vapours which fulgurate if inflamed.....318

IRON } For these 3 the Acid must be diluted... 270

COPPER }360

REG. OF ARSENIC } These are but part. dis. 350

REG. OF ANTIM. }200

TIN.....138

GOLD—dissolved by it after precip. from Aq. Reg.

(1) *Oil of Vitriol.*

Spirit of Vitriol.

(3) *Mineral Sulphur.*

(4) *Pyrophorus.* (see Infl. Subst.)

(a) *Glacial Oil of Vitriol.*

(b) *Colatbar.*

Vitriolated Tartar.

Glauber Salt.

Sal Ammoniac.

Gypsum. Selenites.

Epsom Salt.

Allum.

Marmor Metallicum.

White Vitriol.

Green Vitriol.

Blue Vitriol.

(c) *Inflammable Air.*

PURE is in fact, a Neut. Salt; consisting of the Veg. Alk. and Aer. Acid.

COMBINED with Nit.—sometimes the Vit. or Mur. Acids.

Yields no smell when dry; and but a light lixivious Odor when wet. Its Taste is acrid, urinous and caustic, so as to burn the Tongue.

Obtained from (a) *Asbes of Wood*, and other *Land Vegetables*, (or from (b) *Lees of Wine*, which is more pure, and the *fittest for the Dyer*: or from (c) *Tartar of Wine*, which is the most pure, and *fittest for Chemical Operations*) burnt in the open Air; dissolved by boiling in Water, in an Iron or Copper Pot; filtered through Linen or Cotton to separate the Salt from the Earth; and then evaporated till the Salt, of a Yellow-white Colour, remains dry. Burnt in a covered vessel it produces a Salt less caustic.

(d) Purified—by exposing it to a strong heat, in a crucible; it will first become of a blue-grey col. next blue green, and lastly reddish; and is then free from oleagenous impurities, and fixed Air, the latter of which it will attract if not immediately put into a Bottle, to be close stopped.

1800 Ton of green Oak, or 1300 of dried, will produce about 17 Ton of Ashes; and these will yield one Ton of pure Alkaline Salt. (e) Cupels are made of the Earth of the Sol. of the Wood ashes, again repeatedly washed.

Obtained also by deflagrating (f) *Nit. with Charcoal* (of such Wood, or Tartar, as does not contain Acid; or whose Acid is not destructible by heat) by which means the Acid of the Nitre uniting with the Phlog. is carried off. If Tartar is used the Product is (g) *White Flux*—when the Quantities are equal; (h) *Black Flux*—when the Tartar is double.

(i) Alk. results also from a deflagration of Nitre with certain Met. Subst. as Crude Ant. and Reg. of Arsenic. This is always caustic; the Metals having no fixed Air to communicate.

(k) The Crystals (with difficulty obtained) are Oblong Rectang. 8 edra, terminated by Bases of Two Rectangles, forming Wedges.

AIR communicates to it 3 times it's weight of Water, rendering it a *colourless transp. Liquor*: and sometimes the Aer. Acid, which deprives it of the property of deliquescent.

WATER—It's natural Menstruum, being in equal quantity, dissolves it; but the solution does not produce Crystals without great difficulty: it acquires an oily feel from its action on the fat of the Skin.

HEAT—in a moderate degree, melts it; in a greater degree, volatilizes it. With the Flame of a Blowpipe it becomes opaque, decripitates sometimes, and forms on the spoon a glass button which is permanent; but, on the Charcoal it is absorbed with noise.

ACID-VIT.—unites with it with effervescence, in its mild state; into a Salt difficult to dissolve.....

NIT.—forms with it a *crystallizable Salt*, not deliquescent... Nitre (see Neut. Salts.)

MUR.—a Salt, very like, but less grateful than Com. Salt. Sal. Febrifug. (see Ib.)

VINEGAR.—a *deliquescent Salt*..... Terra foli. Tartari (see Ib.)

TARTAR.—viz. It's Cream or Crystals—a *crystallizable Salt*. Tartarized Tartar (see Ib.)

(a) *Tachenius's Salt*.

SULPHUR—is dissolved by it, and forms a *Mafs* which dissolves Metal. Subst..... Liver of Sulphur.

OILS AND FAT—unite with it (with the caustic most effectually) forming a *saponaceous substance*, soluble in Water, and decomposed by Sp. of Wine. Soap.

EARTHS—CALC.—ARGILL.—SILIC.—AND METAL.—are powerfully dissolved by it, in a proper degree of Heat; and, when nearly equal in quantity, form *Glasses* of various kinds. But if the quantity of Alk. exceeds that of the Earth, three or four times, the Glass is deliquescent. Glasses.

LIME-WATER—poured upon it produces a Precipitate which is truly the Lime, now become mild by the Aer. Acid of the Alk. uniting with it, whilst the *Alk. uniting with the Acid of the Lime, and deprived of the fixed Air, becomes more caustic*; and destructive of animal substances; inasmuch that it can scarcely be filtered through Silk or Woollen Stuff; but Vegetable Substs resist it much better. This is the state in which it is used to mak Soap. Caustic Alkali.

This Sol. filtered, evaporated till dry; and melted in a Crucible until it becomes like Fat; is the Alk. in it's *strongest state of causticity*. It is cut into slips before it hardens, and put into a Phial, which should be hermetically sealed. Caustic Stone.

METAL. SUBST.—are attacked by it; and some of them dissolved. (f) *Nitre fixed by Charcoal*.

GOLD—PLATINA—TIN—COPPER—without difficulty. (g) *White Flux*.

IRON—still easier, giving a fine red Saffron Colour; and SILVER—MERC.—LEAD—with more difficulty. (h) *Black Flux*.

CALCES—dephlog.—are all dissolved by it in the dry way. Mart. Alk. Tincture.

(i) *Nitre fixed by Metals*.

(k) *Crystals of Pot-Ash*.

PURE—Colourless.

CONCENTRATED as high as possible for art, it contains

Acid 708.17

Water 871.9

(a) Obtained—by pouring 3 parts Vit. Acid on 2 dephleg. Nitre, in a Retort, and distilling till no more will come over; or

(b) Two parts Green Vit. calcined to whiteness; 1 powdered Nitre, mixed and distilled together. This is seldom free from Vit. and Mur. Acid; or

(c) One part Nitre dissolved in Water poured on 4 Bole, Clay, or Brick-dust, (or even sand) left to dry and then distilled. Purer than the last.

Purified from Phlog. (the presence of which gives a Topaz colour) by boiling.

—from Vit. Acid, by distilling it with pure Nitre; to the Alk. Basis of which the Vit. Acid will attach itself.

(d) —from Mur. Acid—by dropping into it a Sol. of Silver in Aq. Fortis, so long as it produces milky clouds: when settled decant the Nit. Acid pure.

(e) Dulcified—by putting equal Parts Sp. of Nit. and Sp. of Wine into a Bolt-head, in a warm place. When ebullition stops, decant.

Used in the separation of Silver from Gold, which it will not dissolve; and the making, with Mur. Acid, Aq. Reg. which dissolves Gold, but not Silver.

Also in Dyeing, Etching, and in the preparation of various Drugs.

5.533

1.580

WATER—is strongly attracted by it from the Air. Added to it in a concentrated State, discovers the volatility of the Acid, by the Fumes which appear condensed by its attraction and combination; raises an ebullition and heat: the Vapours are Red, and the Liquor turns green. Snow produces with it intense Cold, from the sudden liquifaction on which part of the heat of the Snow and Acid are employed.

PHLOG.—it has an extraordinary attachment for; uniting with it during the solution of certain Metals, a (1) *Gas* is formed; which, in some instances, is inflammable. This Acid mixed with the Vit. and cast on Sp. of Turpentine, bursts into Flame, with a fragrant Smell.

ALK. { FIXED { VEG. required to saturate 100 Gr. of the Acid.....Gr. 215

{ MINERAL.....365

VOLATILE.....87

EARTH—CALC.—Bitter Salts, deliq. and sometimes phosph. 96

MAGNESIAN.....deliquescent Salts.....75

ARGILLACEOUS.....deliq. Salts.....65

PONDEROUS.....Crystals scarcely soluble

METALS—MERCURY.....crystallizable Salts.....416

SILVER.....crystallizable Salts.....375

LEAD.....crystallizable Salts.....365

COBALT.....350

ZINC.....304

NICKEL.....300

BISMUTH.....290

IRON } forming deliquescent Salts.....255

COPPER }
REG. OF ARSENIC.....220
REG. OF ANTIMONY.....194
TIN.....120
GOLD—slightly diffused; its Calx partly dissolved.

ANIMAL AND VEG. SUBSTANCES—strongly affected by it.

(a) *Smoking Sp. OF NIT.*

(b) *Aqua Fortis*.

(c) *Spirit of Nitre*.

(d) *Purified Sp. of Nitre*.

(e) *Dulcified Sp. of Nitre*.

(1) *Nitrous Air*.

Inflammable Air.

Nitre, Prism. Nitre.

Cubic, Quadrang. Nit.

Nitrous Ammoniac.

PURE—100 parts recently crystallized, contain Alk. 20—Aer. Acid. 16—Water 64.

COMBINED—usually with Vit. or Mur. Acid. Has nearly the same qualities as the Vegetable.

Obtained from Marine Plants (cultivated on Salt Marshes for the purpose, or growing in the Sea) by incineration. The ashes retained in the Kiln are melted by the violence of the Fire, and kept in fusion 2 or 4 hours:

PURE—is not attracted by it from the atmosphere; but, in the proportion of 2 $\frac{1}{2}$ to 1, dissolves it without impetuosity; and, being evaporated from the solution to a certain degree, yields Crystals; which, exposed to air losing their water of Crystallization, fall into a powder that does not deliquesce. In all which this differs from the Veg. Alk.

HEAT—pretty strong, melts it, and then calcines it: in which state, added to water, it does not produce so much heat as the Veg. Alk. does; and it is then much fixed: but, in a violent

BLEACHING.

ALKALI OF THE SEA.

PURE—Colourless; volatile Smell. 3.106
CONCENTRATED in the highest
degree, contains Acid 221.37
Water 928.75 1.150
Of a light Yellow Colour.
Obtained by pouring 1 part Vit. Acid, diluted
with Water, on 3 Com. Salt, (or the Salt may
be dissolved in Water) in a Retort, and distil-
ling whilst any thing comes over; or
From Vitriol, or Clay, or Bole, the Salt
being first decipitated.
(a) *Mur. Air*—is obtained by heating the
fuming Marine Acid in a Retort, whose
Mouth is plunged beneath an inverted Glass
filled with Mercury. This Vapour condensed
(which is effected with difficulty) is twice as
heavy as rain Water.
(b) *Aqua Regis*—being the combination of
the Nit. and Mur. Acid—is made by pour-
ing upon powdered Sea Salt $\frac{1}{2}$ its weight of
good Nit. Acid, in a Retort, and distilling
over the Acid Liquor. *It is the only Liquid
Solvent of Gold.*
(c) Sal Amm. or Sp. of Sea Salt 1 Part,
and 4 of Sp. of Nit. Used for dissolving Gold.
To dissolve Gold, twice its weight of this
Aq. Reg. is required; and the Gold must be
in a ductile State, or made so by heating it
in a moderate clear Fire till red.
Ink stains are taken out of Wood, or even
Linen, by this Acid properly diluted and ap-
plied: *from its nearer affinity to Iron than that
of Vit. Acid.*

PURE—In an Aerial Form—Kills 1.500
Animals. or less.
COMBINED—with Calc. Earth; most plen-
tifully with Fluor or Phosphoric Spars.
Obtained in its Aer. form, by pouring Vit.
Acid on pulverized Blue John, or Sparry
Fluor, into a Leaden Retort, and catching the
Vapour by means of a Pneumatic Apparatus.
If the Retort should be of Glass, and the
Air was to be received into a Vessel contain-
ing Merc. covered with Water, the Acid
would corrode the Silice of the Glass, and rise
in form of Vesicles in the Water; which
accumulating would appear like Jelly.
(a) *Glass is etched* by an extemporaneous
production of Aer. Acid.—The Plate (being
prepared, in the manner pursued in Copper-
etching), is smeared over with Sp. of Vit.;
and Fluor, finely powdered, spread over it.

PURE—In a Concrete Form. 3.391
COMBINED—with Calx of Cobalt, and Phlo-
giston; forming a brittle Metal, or its Calx.
The Smoke gives an Odor resembling
Garlick.
Obtained by distilling 1 part White Arsenic
in Powder, mixed with 6 Aq. Fort. of a
spec. gr. of 11.8; until the Phlog. has dissi-
pated in Fumes, and the Nit. Acid has passed
of a Yellow, then an Emerald Colour, and
lastly colourless; and the Liquor in the Re-
tort becomes White and Earthy. This evo-
porated to dryness, making it red hot, is the
dry Arf. Acid, sufficiently pure; which dissolved
in 4 times its weight of distilled Water, and
boiled until half evaporates, (or suffered to
become fluid by its deliquescence) gives the
Acid in a liquid form, sufficiently concentrated.
(a) Gold in Sol. with Aq. Reg.—and
Merc. in Sol. with Mur. Acid—are separated
from all other Metals which may be mixed
with them, by adding a Sol. of Ars^l. Neut.
Salt, which will precipitate with them; leav-
ing the Gold and Merc. pure.

WATER—uniting with it, suffers little in its fluidity. Is gree- MARINE ACID.
dily attracted by it from the Air.
PHLOG.—it seizes during the solution of Metals, forming a (1)
Gas. Whence the Mur. Acid is proved to be a combination (1) (a) *Muriatic Air*.
of this and Water. Oil of Turpentine has but little effect
on it.
HEAT—produces from it, when combined with Phlog. a Yellow-
green Flame.
ALK {FIXED} VEG.—required to saturate 100 Gr. of Acid...215
MIN.....158
VOL.....79
EARTH—CALCAREOUS is dissolved by it.....438
METALS—MERCURY.....X.....O.....420
SILVER.....X.....O.....400
LEAD.....X.....O.....370
COBALT.....X.....O.....250 to 320
BISMUTH.....X.....O.....312
ZINC.....X.....O.....275 to 310
NICKEL.....X.....O.....290
REG. OF ARSENIC.....X.....O.....198
ANTIMONY.....X.....O.....265
IRON.....X.....O.....264
COPPER.....X.....O.....130
TIN.....X.....O.....the Acid being highly concen-
tred.....130
SILVER—dissolved in Aq. Fort. } unite with Mur.
LEAD.....in Aq. Reg. } Acid, and fall with
it. The precipitate retains the Acid, and melts
with it in the Fire into a Glassy Substance inso-
luble in Water.
N.B. The Solut. marked x yield Crystals; marked o, volatilize the Metals;
marked Δ , develope inflam. Air.
GOLD—not dissolved by it, unless mixed with Aq.
Fortis.
METAL. CALCES.—are all dissolved by it.

WATER—readily combines with it when in its aerial form, pro- FLUOR ACID.
ducing Heat; but no sensible alteration appears on its Mixture
with Ard. Spir.
HEAT—volatilizing it, the Vapours corrode the Glass of the
Retort, and unite with it.
ACIDS—NIT. OR MUR.—but more easily the Vit.—disengage
it in distillation from the Calc. Base.
ALK.—precipitates the Acid from the Silice with which it had
combined.
EARTH—CALC.—It has the strongest affinity with; quitting
others to join with it. LIME-WATER—produces no precipi-
tation, until it is saturated; and then a regenerated Spar is
formed. SILIC.—yields a sweet solution. MAGN.—dissolved
by it, part precipitates in a little time, and the remainder forms
a gelatinous Substance.
METAL-SUBST.—IRON, and its CALX, and ZINC—are dissolved
by it with effervescence, and inflam. Vapours. The Sol. of
Zinc yields Crystals. GOLD—SILVER—MERC.—LEAD—
TIN—BISMUTH—COBALT, AND REG. OF ANT. are not
dissolved by it; but their CALCES are, except of Gold. COP-
PER is partly dissolved by it.

WATER—is greedily attracted by it from a moist Atmosphere. ARSENIC ACID.—
HEAT—urged by the Blowpipe on Charcoal, rapidly restores to Dry
it the Phlog. and regenerates the Arsenic in the S. Metallic Liquid.
form. But, on the Spoon it melts; without fumes, except in
proportion as it receives Phlog. from the Flame, or the Metal
it rests upon.
ACID—MIN.—disengages it from the Metallic Basis.
ALK.—strongly effervesces with it. VEG.—Combined with it
(by mixing it with Nitre, whose Basis it will seize) forms right-
angled quadrang. (1) *Crystals*, terminated with like Pyram. (1) *Arsenical Neut. Salt*.
if the Operation has been performed in *close Vessels*. This
Neut. Salt is incapable of decomposition by any Acid, unless
that it is in union with Metal. Substances; *from all of whose
Solut. (2) (except of Gold in Aq. Reg. or of Merc. in the Mur.
Acid) it will precip. and unite with the Metals*, as they have a
greater affinity to the Arf. Acid than to the others.
If the operation was performed in an *open Vessel*, only an
Alk. Salt impregnated with the Arf. is produced.
EARTH—CALC.—is precipitated by it from Lime-Water; form-
ing a White Salt scarcely soluble in Water, but which is soon
taken up by the excess of Acid. QUICK-LIME takes this
Acid from Alk. ARGILL.—particularly if heated, is power-
fully dissolved by it. On other Earths it has less action.
METAL-SUBST.—IRON does not produce inflam. Air by its
union; the Phlog. being absorbed by the Acid, and forming a
(3) *saline Subs.* ZINC—effervesces with it, *which no other* (3) *White Arsenic*.
Metal does. (4) *This being the only Min. Acid that, in a liquid* (4) *Zinc detected*.
state, has not that property. METAL. CALCES are all dis-
solved by it.

on Salt Marishes for the purpose, or growing MARINE ACID.
in the Sea) by incineration. The ashes re-
tained in the Kiln are melted by the violence
of the Fire, and kept in fusion 3 or 4 hours:
and, when set and cool, are taken out in large,
solid masses. The Salt is naturally impure,
containing several other Salts, nearly in the
proportion of 4 to 1, particularly Sea Salt:
and is generally adulterated also with the vi-
trifiable sand and stones of the shore, cast into
the kiln by the workmen, who are usually
paid by weight.
Purified in the manner of Potash, good
Kelp yields little more than $\frac{1}{4}$ of dry Alk.
Barilla is much richer. 30 oz. Kelp produce
19 of Saline Matter, which yields 12 oz. of
pure Crystals by solution and evaporation:
30 oz. of Barilla produce 22 of Salt, that
yields 16 of Cryst. the difference being
3 hund. in 1 $\frac{1}{4}$ Ton of Salt.
The (a) *Crystals* are 2 Rhomb. 8 edra, of
2 Pyramids joined by their Bases: the Tops
of these are sometimes wanting. Or Rhomb.
8 edra of 2 Wedge-formed Pyramids.
The (b) quality of Fixed Alk. is proved
by triturating it in a Mortar with Cor. Subl.
the brighter the Red Colour, the richer and
purer the Salt.
Min. Alk. has been procured from Sea Salt (of which $\frac{1}{4}$ consists in this Alk.) by triturating it in Water with twice
the weight of Litharge, till it assumed a white colour. After standing some Hours, the acid united with the
Metallic Calx, leaving the Salt pure.

SOAP is made by mixing equal parts of Olive Oil (or Animal Oils or Fat) and Soap Lye; made so weak as not
to support a new-laid Egg; agitating the Mixture till white, putting it over a gentle Fire, and stirring it until
appearing to unite: then, adding twice the quantity of strong Lye, a moderate coction and stirring is continued,
until it is so thick that a Drop as it cools, fixes in the confidence of Soap. As there is no Rule to be relied
upon; a little dissolved in Water, will shew on it's Surface some Drops of Oil, if that predominates: if the
Alk. superabounds it is known by the Taste; and either Defect may be corrected.

GLASS—is a Composition of some of the following Substances united with Fixed Alkali, viz. Vitriifiable GLASS.
Stones, or Sand, or Metallic Slag; Red Lead or Litharge, Arsenic, Nitre, Borax, Com. Salt, Glass of Ant.
and Mangeneze.
Best Flint Glass.
White Sand, fine.....P. 120
Pearl-Ash.....40
Red Lead.....50
Nitre.....20
Mangeneze—more than 0
Arsenic 1 or 2 parts may be added, either to hasten the fusion, or to flux the Metal with less heat.
Green or Bottle Glass.
Sand—coarse.....100
Pearl-Ashes.....200
Slags.....50
These must be ground together.
The (*) Sand and Salt should be calcined together 4 or 5 hours.
(*) Frit.

GLASS for composition of Enamel Colours, or of most Precious Stones.
For this no more Flux must be admitted than sufficient to complete vitrification.
Hardest Glass.
Best Sand, washed.....12 Or Frit, made of Cryst. 200
F. Alk. purified by Nit.....7
Nitre.....1
Borax.....0
If the Furnace is good, Common Salt may supply the place of Borax.
Soft Glass, or Paste.
Sand white and fine.....6 Or Sand.....6
Red Lead.....3
Pearl-Ash purified.....2
Nitre.....1
Borax.....0
Arsenic.....0

RUBY Colour—Hard—Glass 1lb. Calx Classii 3 Dr.—Soft Paste 1lb.—Calx Classii 2 Dr.—Or Paste $\frac{1}{4}$ lb.— Ruby,
Glass of Ant. $\frac{1}{4}$ lb.—Calx Classii $\frac{1}{4}$ Dr.
RED, deep—To the Body add calcined Tin; and, when in fusion, Steel calcined and Iron Scales: if too opaque,
add Cop. calcined to redness.
PURPLE—Body 10lb.—Zaffre 6 Dr.—Calx Classii 1 Dr.—Or Zaffre $\frac{1}{4}$ oz.—Mang. 1 oz. added to the body. Garnet,
GARNET Colours—Body 2lb.—Glass of Ant. 1lb.—Mang. 1 Dr.—Calx Classii 1 Dr. Or Body 2lb.—Glass
of Ant. 2lb.—Mang. 2 Dr.—Or body without Lead 100lb.—Mang. 1lb.—Zaffre 1 oz. vitrified 4 Days.
Or body 20lb.—Litharge 16lb.—Mang. 3 oz.—Zaffre $\frac{1}{4}$ oz.—after 12 hours fusion cast into Water to sepa-
rate the Lead; then melted till pure, in about 10 hours. Or Body 2lb.—Iron Calx $\frac{1}{4}$ oz. when in fusion
add calc. Steel and Iron Scales; and, if the Metal proves opaque, add Brass calcined to redness. It must Vinegar Garnet.
then remain in fusion 6 Hours.
YELLOW—Gold col.—Body without Nitre or Lead 10lb.—Borax 2 oz.—Red Tartar 10 oz.—Mang. 2 oz.— Topaz.
Charcoal 2 Dr. kept in an ordinary fire 4 days. If the Body is made with Nitre and Lead, the Tartar and
Charcoal are to be omitted.
Greenish—Body without Nitre 10lb.—Iron calcined 6 Dr.
Fl. Col.—Body 2lb.—Glass of Ant. 1lb.—Mang. 1 Dr.—after fusion mix them with calcined Vit. Chrysolite,
2 oz. and melt till incorporated. Cornelian,
BLUE, deep—Body 10lb.—Zaffre 6 Dr. 1 Scr.—Mang. 2 Dr.
Lighter—Body 10lb.—Zaffre 3 Dr.—Calx Classii 1 Dr.—or instead thereof Mang. 2 Dr. 2 Scr. Or Sapphire.
Body 8lb. Smalt 1lb.
Light—Body 10lb.—Zaffre 1 Dr.—Mang. 1 $\frac{1}{4}$ oz.
Whitish—Body 9lb.—Copper precipitated with Aq. fort. 3 oz.—Iron Precipitate 2 Dr.—Or Salt decri- Amethyste,
pitated; or calcined Bone $\frac{1}{4}$ lb. Torquoise,
GREEN—Is the foregoing Glass without the Salt or Bone Ashes. Or the Body mixed with calcined Brass and Emerald.
Zaffre.
COLOURLESS AND CLEAR—White Sand 6lb.—Red Lead 4lb.—Pearl-Ash purified 3lb.—Nitre 2lb.—Ars. 5oz. Diamond Paste.
Mang. 1 Scr.—the fusion must continue long on account of the Arsenic.
BLACK—Body 10lb.—Zaffre 1 oz.—Mang. 6 Dr.—Iron Calx 6 Dr.—Or Calx. Lead or Tin added to the Jew.
Body, and, when in fusion, calcined Steel and Iron Scales.

HEAT—strongly, melts it, and then calcines it: in which
state, added to water, it does not produce so much heat as the
Veg. Alk. does; and it is then much fixed: but, in a violent
degree of heat, or boiled in water, it partly volatilizes. A
moderate degree produces in the Crystals the watery fusion, in
consequence of the great quantity of Water which it con-
tains.

ACIDS—unite with it with effervescence. VIT.—forms a Salt
different from the Vitriolated Tartar, in the fig. of the Cry-
stals, and these retaining also a greater quantity of Water, and
flowing with a small degree of heat. NIT.—forms with it a
kind of Nitre, different from that produced by the Veg. Alk.
as pretty strongly attracting the moisture of the Air; and hav-
ing Crystals of a different figure. MUR.—regenerates with it
the Marine Salt; which contains in it a greater quantity of
this Acid than any other Neut. Salt, viz. $\frac{1}{4}$ it's weight. This
differs from the Sal. febring. principally as having a very grate-
ful Taste.

INFLAM. SUBST.—OILS—AND SULP.—have the same effects
with this as with the Veg. Alk.—From ANIM. MATTER— Prussian Alkali.
(as calcined Bullock's Blood) combined with it in equal quan-
tity, augments it's power over metallic solutions. (a) *Crystals of Soda*.

EARTH—the SILIC.—is the most perfectly dissolved by it, form-
ing a clear Glass. Glass.

METAL. SUBSTANCES—MERC.—is precipitated by it from the
subl. in an Orange-coloured Powder. (b) *Quality of fixed Alk.*

Glauber Salt.
Cubic Nitre.
Common Salt.
Prussian Alkali.
(a) *Crystals of Soda*.
Glass.
(b) *Quality of fixed Alk.*
Alk. from Sea Salt.
SOAP.
Soap Lye (see Neut. Salts
on Alkaline Bases.)
(See Mangeneze.)
(*) Frit.
GLASS FOR ENAMEL.
Basis, or Body for Enamel
Colours.
Ruby,
Garnet,
Vinegar Garnet.
Topaz.
Chrysolite,
Cornelian,
Amethyste,
Torquoise,
Emerald.
Diamond Paste.
Jew.
Steel and Iron Scales.

A concrete Acid; reddens the Tincture of Turnsole, curdles Soap-Water, and precipitates Sulp. from an Hepar. Taste is acid and metallic.

Colour very white.

Obtained by pouring 6 Oz. diluted Nit. Acid on 1½ powdered Molybdene, and distilling over a Sand Bath. When the ebullition commences, the Acid rises in real elastic Vapours. Proceeding to dryness (with a more violent fire to extricate the Vit. Acid contained in the Sulp. of the Molybdene) and the operation repeated four or five times, the Residue becomes white; and beingedulcorated with warm water, till freed from the Nit. Acid, and dried, yields about 6½ Dr. of pure Molybdene Acid.

(a) Molybdene is pulverized by triturating it in a Mortar with Vit. Tartar; and this Salt is to be washed away by effusions of Water.

A concrete Acid—reddens Tinct. of Turnsole. Taste, at first sweet, turns bitter. Colour, yellowish-white.

Never had pure, but combined with the Alk. used to dissolve it, and the precipitating Acid. Obtained by mixing Tungst. or Wolfram reduced to powder, with 4 parts Veg. Alk. melting the Compound, pouring it on an Iron plate, and dissolving it in 12 parts boiling water. To the liquor (which must be decanted off a white powder that falls to the bottom), Nit. Acid must be added to saturation, to take up the Alk. and they must be boiled repeatedly. The mixture becomes thick, and deposits a white powder; which, washed and dried, and the adhering Nit. Acid driven off by calcination, gives the Acid of Tungstein in the purest state in which it has been yet procured.

These Acids resemble that of Arf. their Reguli being no more than their several Acids saturated with Phlog. and their Calces in an intermediate state between Acid and Metal, containing sufficient Phlog. to coagulate the Acid, but not to deprive it of solubility.

From Analogy it may be conjectured, that all Metals consist of different (a) fundamental Acids; which, with a certain quantity of Phlog. coagulate into a dry Earth, or Calx; or, being saturated, become Metal.

This is rendered more probable by the late discovery of an (b) Acid obtained from the Nit. Sol. of Tin, by distillation.

In the concrete form is nearly transp. resembling Sulp. in colour and consistence, but less brittle and more inflammable.

Taste, when fluid, is Acid, and then it reddens blue Veg. Colours.

Discovered in no Fossil, except one Species of Lead Ore of the calciform kind; but it is found to exist in all the Solid parts of Animals. Bones containing from ½ to ¼ of this Acid.

Obtained by pouring Vit. Acid on calcined Bones powdered and sifted, to which Water is added, and the Mixture left to digest on a sand-heat 24 Hours, supplying the loss of Water from evaporation, by adding more. The whole being filtered, and the Residueedulcorated with hot water, until it passes insipid, and precipitates nothing from Lime-water; the Fluid then being evaporated to dryness, the remaining Mafs, or Acid, is melted in a crucible to the consistence of glass, and poured out on Marble, and covered

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WATER—500 times its weight is required to dissolve it. It does not deliquesce like Acid of Arsenic.

HEAT—of Fire melts it: urged with a Blowpipe on Charcoal, the Acid is absorbed.

NEUT. SALTS—BORAX acquires with it an Ash-colour, and MICR. SALT, a beautiful green. It is the Acid that colours these Salts, which are scarce ever stained by any thing but Metal [a proof of its metallic quality]. SULPHUR heated with it in a Retort, set so as that during sublimation it will flow back, a Molybdene is regenerated; showing it to consist of its peculiar Acid and Sulphur.

ACID—NIT. easily dissolves it; but does not become yellow, as it does with Acid of Tungstein.

ALK. FIXED—added to it first in small quantities, at the heat of boiling water, affords irregular Crystals. DEPHLOG. decomposes it, indicating the presence of metal. FIXED and VOL. are disengaged by it from Aer. Acid, and a (1) Neut. Salt is formed, which precipitates all metal. solutions—viz. Gold, Cor. Subl. Zinc and Mang. white; Iron and Mur. Sol. of Tin, brown; Cobalt, rose; Copper, blue.

METAL. SUBST.—SILVER and MERC. are precipitated by it from their Sol. in Nit. Acid; LEAD from Sol. in Nit. or Mur. Acid. IMP. METALS boiled in it give a bluish cast.

EARTHS—CALC. MAGN. or ARGILL. it effervesces with, and yields Salts little soluble in water. With POND. dissolved in Nit. or Mur. Acid, it forms a Compound which falls to the bottom, but is not regenerated Spar.

WATER will not dissolve it directly; but, triturated with it, forms an Emulsion which passes through the Filter, and scarcely subsides in Three Months.

HEAT—unless in an extreme degree, does not melt it. Urged with the Blowpipe, it melts by itself. BORAX produces with it a blue Glass; and MICR. SALT, a Sea-green. During calcination, it emits the smell of Nit. Acid, and turns yellow; but on cooling, resumes its paleness; is insipid and insoluble.

ACIDS—VIT. NIT. or MUR. give these Salts a Yellow colour; and in the filtered Sol. a Salt is found with a Basis of the Fixed Alk. used in the production, and corresponding with the Acid employed. But if these Acids are not added to the Salt, but to its Solution, no Precip. follows, even on making the Liquor boil; and the Sol. loses its sweetness, and becomes bitter, unless the Acid has been added in large quantity; and then the Yellow Tungst. Calx is precipitated. ACET. dissolves it with ebullition, or the Sol. deposits a white adhesive matter; which, washed and kneaded, forms a Mafs like Birdlime, fat and sweet; and possesses all the qualities of the Salt, except that it turns blue with Vit. Acid, and precipitates Vitriol of Copper.

ALK.—FIXED—saturating a Sol. of this Acid in Water, produces a Salt with small Crystals. VOL. an Amm. Salt, like pin's points, which, by distillation, gives over the Alk. in a Caustic State. This Amm. Salt decomposes Nitrated Lime, producing regenerated Tungstein; and the Alk. with the Nit. Acid employed in the formation, are found in the supernatant Fluid: which circumstances prove it to be an Acid.

EARTHS—AQUEOUS SOL. of LIME, or ALUM, are not affected by it; but Lime-water poured upon its Sol. in Nit. or Acet. Acid, produces also regenerated Tungstein. MAGN. forms with it a Salt scarcely soluble. POND. aerated an insoluble Precipitate.

METALS—IRON, ZINC, COPPER, dissolved in Vit. Acid; SILVER, MERC. LEAD in Nit. Acid, or LEAD in Mur. all produce with it Precipitates of a white colour. TIN in the Mur. blue. GOLD solutions and MUR. COR. SUBL. are not changed.

WATER—is powerfully attracted by it, and gives an oleaginous appearance: the action of Fire restores the concrete Form. HEAT—at 60°, produces a weak flame: at 160°, burns it with a vivid and destructive Flame.

INFLAM. SUB.—combined with the Acid by any means, produces (1) Phosphorus. Sulp. united to it by fusion, forms a solid compound, which burns with a Yellow Flame, and swells in Water, communicating thereto acidity, and a smell of Hepatic Air. OILS dissolve it, and become luminous: the ESSENT. form a Sol. which takes fire on exposure to Air. (2) Butter of Wax produces this effect most powerfully. ARD. Sp. very strong, dissolves a small portion of it; and this gives a perceptible light on the addition of Water. CHARCOAL distilled with it, produces Phosf. as do TIN, LEAD, IRON, and ZINC; the last in great quantity, when distilled with it by a strong heat.

ALK. MIN.—constitutes with it a (3) Salt of an agreeable taste, resembling Com. Salt; not easily crystallized, unless there is an excess of Alk. which causes efflorescence. VEG. a soluble Salt. BOTH the Fixed Alk. united with it, form a (4) Salt, which is a powerful Solvent of Earths. VOL. produces with it a Salt more soluble in hot than in cold Water. NITRE and SEA-SALT yield their Alk. to it.

ACID OF MOLYBDENA.

(1) General Solvent of Metals.

(a) Molybdene pulverized.

ACID OF TUNGSTEIN, OR WOLFRAM.

(a) Radical Acids of Metals.

(b) ACID OF TIN.

ACID OF PHOSPHORUS.

(1) Phosphorus of Kunckel.

(2) Phosphoric Matches.

(3) Perlate Acid, or Soda phosphorata.

(4) Microscopic Salt.

In an aerial form, resembling Atmospheric Air, but more heavy. Taste acid and caustic. Smell suffocating.

Frequently with Clay, Shifts, and Min. Waters. Also with Animal and some Veget. Subst. in a putrefied state.

Converts blue Veg. colours to green. Differs from Fixed Alk. by its gaseous nature, by its volatility, and by the nature of the Salts it forms with Acids.

Obtained from Sal. Amm. by distilling it over a gentle heat, with an equal quantity of Salt of Tartar. A (a) Vol. Sp. passes over, and a beautiful (b) white Salt sublimes into the Head, and falls into the Receiver; in quantity equal to ½ or ¾ of the Sal Amm.

(c) Crystals resembling those of Sea Salt are found in the Retort.

also more commonly from Chalk or Slaked Lime. (d) A white Mafs then remains in the Retort.

or by using Lime not slaked, in which case the Vol. product is not concrete, but consists of a permanently elastic (e) Aerial Fluid, that readily combines with Water, which it may be made to impregnate without waste, by means of a proper Apparatus.

or from the solid parts of Animal Substances—(f) as Hartshorn—by distilling them in bits over a Fire, gently raised, rejecting the Oil which comes over, and redistilling the Sp. and Salt united repeatedly. The Salt will at length be exceedingly white, and the Spirit limpid and of a grateful odour.

(g) The Residuum burnt is a most pure absorbent.

APPENDIX of ACIDS;

Which, though they do not belong to the MINERAL KINGDOM, are, however, employed in the ANALYSES of MINERAL SUBSTANCES, having a strong affinity to them.

The product of the fermentation of Vinous Veg. Juices, extended beyond the stage which generates Vinous Liquors or Spirits: or excited after they had acquired the Vinous properties.

(a) VINEGAR, made by mixing the Wine with its Lees and Tartar, in a Vessel not too broad or shallow, nor quite filled; exposing the Liquor to external Air in a moderate warmth, and stirring it from time to time. A new fermentative motion arises, attended with heat, and, at length ceases, the Liquor having become an Acid: at this period the Vessel must be closed.

Vessels already used for the same purpose are the fittest. And the Vinegar will be the stronger if fresh cuttings of the Vine are added, and the Stalks of the Grape interspersed through them.

The stronger and more generous the Liquor, the stronger will be the Vinegar.

(b) ——— concentrated by evaporating ½ of the best Vinegar in a glazed earthen pot, with a Water Bath, and distilling the remainder in an Alembick with a Glass Head, gradually increasing the heat as long as the Spirit comes off clear.

(c) ——— or by exposing it to Frost, and rejecting the Icicles which form in it, and consist of the Water.

(d) ——— purified from Oil and all extraneous Matter by a combination of these two processes.

(e) RADICAL VIN. 2 parts foliated Earth of Tartar, distilled with 1 of Vit. Acid. This Acid uniting with the Fixed Alk. the Acet. Acid passes over with effervescence, and of more intense properties than common Vin.

(f) ——— or Vinegar poured from time to time on powdered Spanish Verdigris, in a heat of 150°. until it is found no longer to become green: the Liquor evaporated to a

AIR—volatilizes it into an Aerial form.

WATER—combining with it produces heat; but, if frozen, is dissolved with an intense degree of cold.

HEAT—raises it in forma ficca, if pure.

NITRE—deflagrates with it; denoting the presence of Phlog.

ACIDS—it less strongly attracts than Fixed Alk. does.

ALK. FIXED—disengages it from Acids with which it has been combined, by uniting with the Acids.

EARTH—CALC. has the same effect: being calcined, leaves the Alk. in a Caustic and Aerial state.

METAL. SUBS.—GOLD is precipitated from Aq. Reg. by it, and the (1) Powder, being heated, fulminates.

SILV.—precipitated from its Nit. Solution by Lime-water, and being dried in the open Air three days, and then stirred in a Solution of Caustic Vol. Alk. assumes the form of a (2) black Powder, which, exposed to the open Air, fulminates upon the application of the smallest degree of heat, by agitation, even occasioned by the falling of a few drops of Water on it, with more violent effects than are produced from fulminating Gold or Gunpowder.

COR. SUBL.—in solutions is precipitated by it of a white colour, which (3) distinguishes this from the Fixed Alkalies.

COPPER—solutions it tinges blue, and (4) is therefore a nice test of its presence. If a large quantity is added it dissolves the Metal afresh; the colour decays and disappears if it is kept in a close Phial; but is gradually restored by admitting Air, as if Phlog. and Light were the same; capable of pervading Glass, and of uniting to, or separating from, some substances, under various circumstances.

TIN and BISMUTH are precipitated by it from their solutions in Nit. Acid, and then dissolved.

ANIMAL and VEGETABLE SUBST. contain it, or the materials for composing it; and it probably derives its origin in the Min. Kingdom, from the putrefaction or combustion of these.

VOLATILE ALKALI.

(a) Sp. of Sal Volatile.

(b) Sal Volatile.

(c) Sal Sykvi.

(d) Fixed Sal Amm.

(e) Caustic Vol. Alk. or Alkaline Air.

(f) Spirit and Salt of Hartshorn.

(g) Calcined Hartshorn

(1) Fulminating Gold. (See Gold.)

(2) Fulminating Silver.

(3) Test of Vol. Alk.

(4) Test of Copper.

ACID OF FERMENTED LIQUOR.

(1) Distilled Vinegar.

(2) Foliated Earth of Tartar, or Sal Diureticus or Regeneratus.

(3) Radical Vinegar.

(4) Sp. of Mindererus.

(5) Test. of Calc. Earib.

(6) Curuse and Sugar of Lead.

(7) Verdigris.

(8) Distilled Verdigris (improperly).

(a) Vinegar.

(b) Distilled Vinegar.

(c) Vin. concentrated by Frost.

(d) Purified Vinegar.

(e) Radical Vinegar.

(f) Ib. or Distilled Verdigris (falsely).

(g) ALEGAR.

BORACIC

Is almost a Neut. Salt. however red- dens Tinct. of Litmus, but not of Violets. Taste is very weak.

Obtained by adding to Sol. of Borax, in boiling Water, some Vit. Acid; which seizing the Alk. Basis, the Acid separates in form of Scales, brilliant, small, thin, and light.

also from a hard, whitish Cryst. Stone of 20 Faces, opaque, or S. transp. of lamell. Texture, discovered in the Cleft of a stratified Mountain of Gypsum. Found to contain Acid 68—Magn. 13½—Lime 11—Clay 1—Calc of Iron 1—Silic 2—loss 3½.

Produces, very feebly, the properties of an Acid. Obtained from Yellow Amber by distillation; an Acid Liq. first comes over, then an Oil, and lastly this Vol. Acid. in a concrete form. Purified somewhat by solution and crystallization.

Is the Product of the union of Phlog. and Dephlog. Air: for Charcoal, burned in a close Vessel over Merc. with Vital Air, produces it.

Excites a distinct sensation of acidity, but is the weakest of most Acids. Reddens the Tinct. of Turnsole.

Heaviest of all aerated substances, therefore sinks to the Bottom in (a) Pitts, Caverns, &c.—In these places it is found combined with (b) Water, Ores, or Absorb. Earth, and composes ½ of the weight when pure. Is to Common Air as 3 to 2.

Renders substances with which it is combined, mild. These effervesce with Acids, from the expulsion of the Fixed Air.

Obtained from Calc. E. or Ores (best from Calc. Spar.) in coarse powder mixed with distilled Water, by dropping upon it Vit. Acid, to expel into a Glass Vessel the Air slowly, through Water placed therein, which will absorb the Vit. Acid.

It preserves Anim. Subst. but kills Animals which breathe it; and extinguishes Fire.

VITRIOLIC concentrated.....

(a) Silver is separated from Metals plated with it, by pouring over bits of the Metal, in a glazed earthen Pan, a Mixture of 10lb. Vit. Acid and 1 of Nitre, keeping it in a moderate heat. When saturated, the Silver is precip. by Com. Salt; or, in its metal. state, by Sol. of Copper.

MURIATIC—See Mur. Acid.....

water; the Fluid then being evaporated to dryness, the remaining Mafs, or Acid, is melted in a crucible to the consistence of glass, and poured out on Marble, and covered with a Bell-glass, to prevent deliquescence. What remains in the Filter is a selenetic Salt.

also from Sticks of Phosp. placed upright in a glass Funnel, which is to be inserted in the mouth of a Bottle containing distilled Water of a heat exceeding 60°.

The Acid, separating from the selenetic Base, will pass into the Water; and this may be made concrete by evaporation.

SALT. BOTH the Fixed Alk. united with it, form a (4) salt, which is a powerful Solvent of Earths. VOL. produces with it a Salt more soluble in hot than in cold Water.

NITRE and SEA-SALT yield their Alk. to it. EARTH—CALC. forms with it a combination scarce soluble in Water, unless the Acid is in excess. The earthy Residue of Bones is of this Substance.

SILIC. it does not appear to act upon, although it corrodes Glass when hot. MAGN. produces with it a crystallizable Compound of difficult solubility. And POND. a Salt of unknown properties.

METAL. SUBST.—CALX of COPPER is readily dissolved by it; but it only tinges the filings of the metal green. CALX of IRON it freely dissolves. LEAD and ZINC are dissolved only when it is in a concentrated state: the Sol. of the last is fetid.

WATER—Cold, 50 times the weight required to dissolve it; a smaller quantity will suffice of hot Water, which volatilizes it. One Pint dissolves only 183 gr.

HEAT—melts it with less intumescence than it does the Borax: after defecation it remains fixed. Urged with a Blowpipe, it runs into a glass, which is soluble in Water.

SP. of WINE—dissolves it; and being set on fire, it burns with a green Flame.

NITRE and COM. SALT—yield their Alk. Basis to it. ALK. and EARTHS—CALC. POND. and MAGN. combine with it in the humid way, forming Salts hitherto little known; and the Earth precipitated from the LIQUOR SILICUM, is attacked by it.

MET. SUBSTANCES—are not dissolved by it in the humid way; but their combinations may be effected by double Affinity.

ALK.—has less attraction to it than Earths have. MIN. forms with it a crystal. Salt, not deliq. VEG. a Vol. Salt very deliquescent.

EARTHS—CALC. and POND. produce with it Crystals of difficult solution. ARGILL. Crystals. MAGN. a gelatinous Substance. But the (1) POND. has the greatest attraction to it, and will disengage it from the others.

MET. CALCES—are dissolved by it, and form non-deliq. Crystals.

WATER—under the common pressure of the Atmosp. and at a low temperature, absorbs more than its bulk of fixed Air, constituting a weak Acid. Hot absorbs less. Aerated by art, and mixed with suitable Salts (1), salubrious Compounds are made. Separated from Water by congelation.

HEAT—expels it from Earths with effervescence. PHLOG. SUBST.—are strongly attracted by it. ETHER doubly expands it. SP. of WINE and OIL of TURP. absorb twice their bulk. OIL of OLIVES, more than its bulk. PLOMBAGO contains it abundantly.

ACIDS—almost every kind dislodges it. ALK.—form with it (2) cryst. Salts, less active than the Caust. Alk. ALKALINE AIR a (3) concrete Vol. Salt.

EARTHS—combined with it, are all nearly insol. in Water. SILIC.—is not acted upon by it; and ARGILL. little disposed to unite with it, though Lac Lunæ consists of Clay saturated with Fixed Air.

METAL SUBST.—IRON, ZINC, and MANG. form with it Salts, whose Sol. in Water, reddens the Tinct. of Turnsole. METAL CALCES usually contain Fixed Air.

VEG. MATTERS—in the state of Vin. fermentation, emit abundance of it, which remains in the upper part of the Vessel. (4) A candle extinguished in this, the smoke floats upon, and renders visible, the surface of the Fluid.

MET. SUBST.—are hardly acted upon by it; SILVER excepted.

(a) Silver is separated from Metals plated with it, by pouring over bits of the Metal, in a glazed earthen Pan, a Mixture of 10lb. Vit. Acid and 1 of Nitre, keeping it in a moderate heat. When saturated, the Silver is precip. by Com. Salt; or, in its metal. state, by Sol. of Copper.

MURIATIC—See Mur. Acid.....

ACID of BORAX.

ACID of AMBER, or SUC- CINOUS ACID.

(1) Test. of Pond. Earth.

ACID of AIR, or FIXED AIR.

(1) Facitious Min. Wa- ter.

(2) Mild Alkali.

(3) Concrete Vol. Alk.

(4) Fixed Air made vi- sible.

(a) Choke damp.

(b) Mineral Water.

KEIR'S COMPOUND

ACID.

(a) Silver plating dis- solved.

AQUA REGIS.

VEGETABLE

TARTAROUS

Obtained by boiling 1 lb of Cream of Tartar in 5 or 6 of Water, and adding ½ lb of strong Vit. Acid. When the Sol. is complete, a (a) Salt is formed by the union of Vit. Acid and the Veg. Alk. which sinks to the bottom. The Liquor being evaporated to ½, filtered, and set, in the consistence of Syrup, in a place rather warm, will afford fine Acid Crystals, equal in weight to ½ the Cream of Tartar employed.

Obtained by pouring a Nit. Sol. of Pond. Earth into a Sol. of Salt of Wood Sorrel in Vol. Alk. The Earth combining with the Acid of Sorrel, forms a compound, insoluble in Water, that falls to the bottom. This being washed, is decomposed by Vit. Acid, which produces an insoluble combination with the Earth, whilst the Acid is set at liberty; the clear Liquor, being evaporated, shoots into Acid Crystals, of 4-sided Prisms, or square Plates.

Obtained by boiling 3 ounces of Nit. Acid with 1 of finest Sugar. When dark brown, 3 ounces of Acid is added; and when the fumes cease, the Liquor, being poured out and cooled, yields Crystals. Treating the Mucilage in the same manner, more are formed; and, then the whole being depurated by repeated solutions and crystallizations, ½ of the weight of the Sugar is found in Acid Crystals.

These two Acids differ only by the former containing a little Alk.....

GALLIC

The astringent principle of Nut Galls. Reddens Tinct. of Turnsole.

Obtained by digesting for a fortnight, in a warm place, 1 lb of Powder of Galls in 6 of distilled Water; filtering and evaporating the Liquor, 2 or 3 months, in the open Air, and decanting it from the Pellicle and small yellow Crystals which will be formed. On these 1 lb of Ard. Sp. being poured, dissolves the Salt, with the assistance of heat, without touching the Mucilage; and, by evaporation, the Acid shoots into brilliant yellow-grey Crystals.

PRUSSIAN

Obtained by boiling Pruf. Alk. with Vit. Acid. The Acid (or colouring Matter) passes over in form of Infl. Air, and is absorbed by Water in the Receiver.

Purified from Vit. Acid by distillation with Chalk. (See Infl. Sub.)

a Calx which yields deliq. Crystals. TIN loses a small portion to it by digestion. BISM. and its CALX are slightly soluble in it. NICKEL yields green Crystals. REG. of ARS. insoluble by it; but the CALX is taken up. REG. of COBALT not affected, but its CALX affords a rose-coloured sol.—ZINC, and its CALX, or (as is said) united with other Metals, is soluble with it. REG. of ANT. imparts an emetic quality to it. MANG. combines with it by repeated distillation. WOLFRAM and MOLYB. are not known to be affected by it.

WATER—dissolves the Crystals more readily than it does those of Tartar, although their component parts (this Acid and Veg. Alk.) are easily dissolved: but it is not deliquescent. WATER and ARD. SP. digesting it, converts it into Acet. Acid.

HEAT—of fire, in contact with it, melts and turns it black. By distillation, it affords an acid Phlegm, small quantity of Oil, much fixed, and a little inflam. Air. The coaly Residue contains neither Acid nor Alk.

NIT.—converts it into Sac. Acid by distillation.

ALK. MIN.—forms with it a crystallizable (1) soluble Salt. VEG. (2) Crystals very soluble. VOL. less soluble.

EARTHS—CALC. combine with it into Salts scarcely soluble; convertible into Cream of Tartar by addition of Veg. Alk.—MAGN. and ARGILL. are dissolved by it, and form Salts, which, by evaporation, assume a clear gummy consistence, and are not deliq.

WATER—boiling, dissolves its own weight, half of which is separated in Crystals on cooling.

HEAT—reduces it to powder in a Retort, with ½ loss of weight; melts, boils, and turns it brown: Acid Phlegm passes over; part of the Acid sublimes; and Fixed and Infl. Air are disengaged.

ACID NIT.—converts it into Acet. Acid and Fixed Air. Sac- carhine does not differ from it.

ALK. MIN.—in excess, forms with its Sol. in Water, a Salt of sparing solubility. VEG. produces a (1) Precip. containing the Acid in excess; more Alk. added to saturation, gives a very soluble Salt, which becomes crystallizable, if the Alk. superabounds.

VOL. affords with it a crystallizable Salt.

EARTHS—CALC. it has the greatest affinity to, and forms with it an (2) insoluble Compound, not to be decomposed in the moist way; is therefore the best Test of the presence of Lime, which it precipitates from all its combinations. MAGN. forms with it a white powdery Salt. POND. a Salt scarcely soluble, unless Acid exceeds; and then it yields Crystals soluble until the excess is taken up by the boiling Water.

METAL. SUBST.—several of the Metals are acted upon by it; but it combines more readily with their CALCES.

ACID of TARTAR.

(1) Rochelle Salt.

(2)(a) Soluble, or tartar- ized Tartar.

ACID of SORREL.

(1) Salt of Sorrel.

(2) Test. of Calc. Earth.

ACID of SUGAR.

ACID of GALLS.

(1)(a) Writing Ink.

(2) Infusion of Galls co- lourless.

(3) Test of Iron.

ACID of PRUSSIAN BLUE.

(1) Test of quantity and quality of Iron.

ACID MUR.—aerated by mixing with it, becomes phlog. and the Pruf. more odorous and volatile.

ALK. and EARTHS, CALC. MAG. and POND. form with it peculiar Salts, capable of precipitating Pruf. Blue from Sol. of Iron. (1) ALK. or LIME combined with it, are used to discover the quantity and quality of Iron in a Solution: but it is necessary first to find out by accurate experiment, what quantity of Iron a given proportion of the probatory Liquor is ca- pable of precipitating.

BORACIC

SUCCINOUS

AERIAL

COMPOUND

ASYNOPOSIOS

SUBSTANCES

And capable (by various combinations between the kinds, or with some other Substances) of producing New Bodies, generally solid, and of angular Form.

Refusing from the Union between an Acid and an Alkali, Earth or Metal. Soluble in less than 200 Times their Weight in boiling Water. Perfect when, upon Application of proper Tests, neither the Acid nor the Alkaline Properties are exhibited. Imperfect when, from defect in Quantity or Strength of one of the Ingredients, the property of the other prevails.

COMPOUND or NEUTRAL SALTS

Combination.

Sp. Gr. 1

Affinities.

Resists.

100 Parts contain Veg. Alk. 63—Vit. Acid 31—Water 6.
The Crystals obtained with great difficulty are Rectang. Hexag. Prisms, terminated by Pyramids of a like number of Sides, with obtuse Points. Taste disagreeable, although somewhat like common Salt. Combined by dropping successively to saturation oil of Tartar per Del. quantity of fixed Veg. Alk. on Vit. Acid diluted with three times its quantity of Water, often shaking the matras; then adding warm Water to dissolve such Salt as has settled at the bottom; evaporating to a Pellicle and suffering it to crystallize.
Or by throwing Salt of Tartar on Green Vitriol dissolved in Water, (half a Pint to an Oz.) till effervescence ceases; then filtering, &c.

100 Parts contain Veg. Alk. 63—Nit. Acid 30—Water 7. and 1 1.920
Large quantity of Vit. Air.

Taste is cooling at first, but soon becomes disagreeable. Gives a red colour to raw Flesh, being rubbed thereon. The Crystals are Hexag. Prisms terminated with Pyramids of the same number of Sides.

NITRE is made by pouring on Nitrous Earth (whether native, or resulting from combination of putrid Animal or Vegetable Substances with old Mortar or loose Calc. Earth, long exposed to the Weather in Beds under open Sheds, and frequently turned) twice its weight of boiling Water, in large Casks; tapping it after 24 hours, and adding more Water, perfectly until it comes off without a falme Taste; these are evaporated in a Boiler; and the Sea Salt which falls down is to be carefully removed whilst the Water is warm. It is then suffered to cool and crystallize. A thick Liquor remains, from which is obtained a fort of Magnesia. It may be necessary to add some Wood Ashes if the Acid superabounds in the composition, to furnish with an Alkaline Basis the redundant Acid. Purified by repeated Solution in Water, and Crystallization, by which it is freed from Com. Salt.

(b) Made extemporaneously by dropping Aq. Fort. to saturation on Fixed Alk. dissolved in eight times as much warm Water, filtering and suffering it to crystallize.
Detected by the Odour of the Acid produced on pouring to saturation Vit. Acid on the suspected Earth.

100 Parts contain Veg. Alk. 63—Mur. Acid 30—Water 7. 1.836
Taste is saline and sharp, but disagreeable. Crystals are Cubical like those of Sea Salt.

SEA SALT is obtained by diffusing and crystallizing the Salt found in the Retort after the Process for Sal Volat. Or combining to Saturation the Acid and Alk.

An imperfect Salt, slightly displaying the properties of Alk. which predominates in it. Resembles Pot-ash. Taste is Alkaline and Unisous. MILD VEG. ALK. produced by impregnating Veg. Alk. with Fixed Air.

100 Parts contain Min. Alk. 22—Vit. Acid 14—Water 64.
Taste is nauseous; but favour saline and cooling. Crystals are of various forms (derived from a Rectang. Obeloid. Prism, ending both ways Wedge-like) and large in proportion to the quantity of Water evaporated before crystallization.

GLAUBER SALT is made from the Mats remaining after the distillation of Sp. of Sea Salt; by melting it first, to dissolve some of the Acid; then diffusing it in warm Water, to be evaporated to half; filtering and crystallizing.
Obtained also from Bittern of Salt-works [where Sea Grom is used, unfatuated part of the Alkali.]

100 Parts contain Min. Alk. 50—Nit. Acid 29—Water 21 1.870
Crystals are Rhomboidal, with nearly equal sides, the obtuse Angles being 100°, and the acute 80°.

QUADRANG. NITRE obtained by dropping Aq. Fort. into a warm solution of Min. Alk. until the hissing ceases; then adding Water, filtering, evaporating to a Pellicle, and laying it by to crystallize.

100 Parts contain Min. Alk. 50—Mur. Acid 33—Water 17 1.2120
Flavour is saline and agreeable. And it has the Property of preserving Animal Substances better than any other Salt, without destroying taste or quality, but (a) it must be added in some quantity, for if the proportion should be very small, it will promote their corruption.
Crystals are S. transparent hollow Pyramids formed of Cubic Grains thus: the first formed Grain, being the Apex, attracts to its upper edges other Grains in the progress of Crystallization. These floating with their upper face level with the Water, of course deprives the Apex; and are also until the Sp. Gr. of the Pyramid exceeds that of the Water; and to on lighter by the separation of the Salt, and then it sinks to the bottom. COMMON SALT is made in hot Climates from Sea Water, introduced at flood Tide into a series of large Basins, shallow, and lessening in their dimensions; the Water being thus in a constant state of evaporation, and the time it reaches the remotest of these, which is deeper and well lined with Clay, it is sufficiently evaporated to permit the (a) Salt to crystallize, and this is shovelled on the Bank to drain, when a proper quantity is formed.
Obtained in less hot Climates from the Water of Salt Springs, or Solutions of Fossil Salt, or of impure Bay Salt, evaporated to a Pellicle in large shallow Iron Pans, towards the end, the (c) larger the Crystals, and stronger the Salt.

The (d) Water remains contains various heterogeneous Matters, and a (c) White sileneous Powder collects at the Bottom of the Pan. Sour Whey added to the Brine, combines with any redundant Alk. which may otherwise adhere to the Salt, and occasion its deliquescence. The Water of Salt Springs, or of the Sea, may be strengthened by pumping it to the top of a lofty Building, open on all sides, and letting it fall through wicker Floors covered with Straw, to promote evaporation. Or by suffering it to freeze, and rejecting the impid Ice.

Purified from Calc. Earth, by diffusing it in distilled Water, precipitating with Min. Alk. filtering and evaporating to crystallization. Fossil SALT. Yields the purest White Salt. One Pint or 16 Oz. Water is required to dissolve 6 of this Salt; whence it will appear that the strongest Brine will yield 1/2 of White Salt.

WATER—cold fixates, or boiling five times its weight diffuses it; the Crystals are restored again by evaporation. Is not attracted by it from the Air. HEAT—moderately, causes its decomposition; violent, melts and at length volatilizes it, but form a Sulphur, upon which the Alk. re-acting, a (1) reddish matter, emitting an hepatic Acids—almost all of them act upon, and decompose it. ALKALIES—do not render it turbid. EARTHS—in their simple State are not affected by it; but CHALK and also SILVER, LEAD, and MERC. dissolved in Nit. Acid, are precipitated by it. INFL. MATTERS—particularly CHARCOAL, decompose it.

WATER—cold even times, boiling half its weight diffuses it. Is not deliquescent. length diffuses the (1) Acid in form of fuming Vapours with much vital and some phlegmatized Air; and in time the whole of the Acid is diffused, the Alk. being left behind somewhat altered by the addition of part of the Earth of the Retort.

INFLAM. MATTER—suddenly brought into contact with it; the one or the other being ignited, a deflagration ensues (or a detonation if the mixture is in a confined situation) with a white Flame. SULPHUR produces fewer, but more vivid explosions than CHARCOAL. This effect takes place also in Vacuo, which shows that it proceeds from the sudden discharge and expansion of the Vit. Air with which it abounds. The Infl. Subs. being added in small quantity the deflagrations cease at length, and the Nitric changes to a bluish collected and condensed into a (3) Liquor, threw no token of Acidity; but by distillation yield a Vol. Alk. in a concrete form.

If TARTAR is used in equal Parts the Alk. produced is pure; if in the proportion of two to one it retains some Phleg. (4) These are powerful Menstrua. If SULPHUR is used the Alk. remaining is saturated with the Vit. Acid of the Sulphur, and forms a (5) New Salt; mixed however with a little Hepar, from which the Sulphur, Principle being expelled, a pure Vitriolated Tartar remains. ACIDS—MUR.—mixed with it produces Aq. Reg. TART. disturbs its Solution. ALKALIES—do not affect its Solution. METAL. SUBST.—REG. OF ANT. ZINC, BISMUTH, ARSENIC, REG. OF COBALT, TIN, and LEAD, become calcined by it; and thus are (6) separable from Gold and Silver.

WATER—hot or cold, three times its weight diffuses it. HEAT—occasions successively its Description, Aqueous Fusion, and Volatilization, without Salt decs. Decomposition. By the Blow-pipe it exhibits nearly the same Phenomena that Common Acid Nit. diffusing it produces Aq. Reg. TART. occasions a Precip. SILVER—dissolved in Nit. Acid makes its Solution in Water cloudy.

WATER—cold four times its quantity, when but a smaller quantity diffuses it. HEAT—exposes the Aerial Acid, leaving the Alk. pure. Urged by the Blow-pipe it melts, and is absorbed by the Charcoal; but, in the Spoon forms a glassy Bead, which becomes opaque. ACIDS—stronger than the Aerial, effervesce with and decompose it. ALK.—always superabounding in it; when added do not affect it. EARTHS—CALC. and PORD. having a greater affinity to the Act. Acid than to the Veg. Alk. are (1) decomposed by it.

AIR—produces its spontaneous evaporation, by which, as well as by melting, it loses near half its weight. WATER—cold, four times its weight, temperature three, but in equal parts, diffuses it. HEAT—melts, and in a high degree volatilizes it. Urged by the Blow-pipe it leaves on the Charcoal a reddish Mats, (a true Sulphur) yielding an hepatic Smell, especially if a little Vit. Acid is added. Acid Nit. and MUR. and even CAUST. FIXED VEG. ALK. decompose it; by means of their double Affinities.

WATER—is attracted by it from the Air, which renders it unfit for Gunpowder: when cold 12, temperature 3 times its Weight diffuses it. HEAT—excited by the Blow-pipe produces the watery fusion, and it becomes fixed on the Spoon, but on Charcoal makes a fort of deflagration, and uniting with the Phleg. emits Flames of a Yellow colour, in which, and its deliquescence it differs from Potash Nitre. ACID—VIT. expels the Nit. forming Glauber Salt. MUR. mixed with it makes Aq. REG. TART. causes no precipitation. ALK.—FIXED VEG. decomposes it, but the Sol. discovers no precipitation.

WATER—is attracted by it in a small degree, when exposed to moist Air. Three times its weight of cold, two and a half of temp. or a little less of boiling diffuses it: This difference is owing as to afford an easy means of separating this Salt from others which, in the same Situation, are presented to crystallize by the heat. HEAT—produces its description, watery fusion and calcination; destroying its transparency, and rendering it more acid. The heat being excited and the Air having access, it subsides in white Flowers; but without alteration of its qualities. ACIDS—VIT. NIT. and BORAC. are the only which decompose it. ALK.—FIXED VEG.—when caustic decompose it. TARTAR has no effect on it. METAL. SUBS.—CALC. OF LEAD decomposes it; by which (1) the Alk. may be obtained.

ARSENIC—does not. WATER—introduced at flood Tide into a large Pond, where, in a little time, it deposits its impurities; hence it runs the time it reaches the remotest of these, which is deeper and well lined with Clay, it is sufficiently evaporated to permit the (a) Salt to crystallize, and this is shovelled on the Bank to drain, when a proper quantity is formed.

Obtained in less hot Climates from the Water of Salt Springs, or Solutions of Fossil Salt, or of impure Bay Salt, evaporated to a Pellicle in large shallow Iron Pans, towards the end, the (c) larger the Crystals, and stronger the Salt.

The (d) Water remains contains various heterogeneous Matters, and a (c) White sileneous Powder collects at the Bottom of the Pan. Sour Whey added to the Brine, combines with any redundant Alk. which may otherwise adhere to the Salt, and occasion its deliquescence. The Water of Salt Springs, or of the Sea, may be strengthened by pumping it to the top of a lofty Building, open on all sides, and letting it fall through wicker Floors covered with Straw, to promote evaporation. Or by suffering it to freeze, and rejecting the impid Ice.

COMMON SALT.
Sea Salt.
(1) See Min. Alk.
(a) Preserving Meat.

(a) Bay Salt.
(b) White or refined Salt.
(c) Sherry Salt.
(d) Master of Salt or Brine.
(e) Scrub.

GLAUBER SALT.
Sal Mirabile.
Sal Catharticus Glauberi.

DISSOLUTIVE SALT.
Sal Sylliv or Sal Febrifugus.

(1) Master of Nitre.
(b) Regenerated Nitre.

NITRE or Salt-Petre or Prismatic Nitre.
(1) Nitrous Acid.
(2) Nitre fixed by Charcoal, &c.
(3) Sal. Polychroft.
(4) Black and White Flus.
(5) Crystals of Nitre.
(6) Gold and Silver purified by Nitre.

BASIS OF A L K A L I

Combined with ACID of NITRE

SEA SALT

VITRIOL

FIXED VEGETABLE ACID Combined with NITRE

SEA SALT

AIR

MATTER

MINERAL A LOG Y.

MINERAL A LOG Y.

under the Surface of the Earth; defixture of Seed, Life, or Circulation of Fluids

INFLAMMABLE SUBSTANCES

Diffoluble in Oils, but not in Water, which they repel.
Combustible or Inflammable by Heat; and defructable thereby.
Electric per fe, generally.

Qualities and Composition.	Sp. Gr.	Affinity.	Texture and Colour.	Particulars.
Small disagreeable. Light of all Aerial substances, viz. ten or twelve times lighter than Common Air: on which account it is employed in the Aérostat. (a) Slightly acidulous, turning red the Tincture of Turn-Dimble; the Sp. Gr. of Bodies in which it is contained; hence Metals are lighter than their Calces. <i>Extinguishes flame</i> , and is <i>nearest to the Lungs of Animals</i> . Hinders putrefaction; but in a degree very inferior to Acetate Vegetation.	0.035	Water—does not seem to be essential to its existence, not absorbs it; but an Amalgam of Merc. and Zinc, previously dried, produce a quantity of Inflam. Air, in a close Vessel.		INFLAMMABLE AIR. (Ignis fatuus, Floating Stars and Jack of the Lantern, &c. all proceed from this.)
INFLAMMABLE AIR is artificially produced by the defoliation of Iron or Zinc in all the known Acids, except the Nitrous. By digesting Iron in an Infusion of Galls. By dissolving Zinc in the Mineral Alk. By combining Iron and Zinc with Vol. Alk. By calcination of these two Metals in the Fire. And by amalgamating Zinc, and Merc. in a close Vessel. Oils, Bitumens by distillation or digestion on the Fire; Lime, or even Powder of Pebbles digested with Mur. Acid or Air, produce it.		FLAME—of a Candle, Electric Spark, or that produced by the stroke of a Flint on Steel sets it on fire; but the latter not so readily, as it occupies the highest situations where it is confined, on account of its levity. Hence this kind of Light is used in Mines subject to (6) inflammable vapours.		(1) Combustion.
(6) PYROPHORUS. 4 oz. Allum. 1 Wheat Flour Cined together, put into a Matras set on a strong Sand Heat, and continued for about an Hour: a Blue Blaze usually denotes the Process finished. It is then to be put into a Bottle (from which both Air and Light are to be excluded) for use.		ACID—all except the NIT. dissolves it from Iron or Zinc, but the VIT. requires to be much dephlegmated, and the Water perfectly separated, the (8) <i>Menture</i> catches Flame in the open Air. The (9) Infl. Lime WATER is not affected by it, unless when it is inflamed over the Water, which then becomes cloudy, and less fall a Precipitate.		(2) Vital or dephlegmated Air.
100 cub. inches of this Air may contain 8 gr. of Sulph. in solution in the temperature of 60°, and more in a hotter; fufained by Vit. or Mur. Air. <i>Extinguishes the flame of a Candle</i> immersed in it, and kills Animals enclosed therein. Does not change the colour of Paper tinged with Fernambuco Wood; but the Tincture of Turnsole Hepatic Air is obtained artificially from Liver of Sulph. whether the Bate is Alk. Earth or Metal, as containing sufficient Phlog. and not too strongly attracting that of the Hepar. Alk., by distilling a mixture of Sulph. and Charcoal, or Oil.		ACID—COMMON or NITROUS, $\frac{2}{3}$ its Bulk mixed with it, the Blaze of a Candle will set it on Fire, filling the Vessel with Smoke, which smells like Vol. Sp. of Sulph. and a White Powder, being the Sulphur, is precipitated. DEPHLOG. Air produces a detonation, and becomes phlogisticated.		(3) Phlogisticated Air.
100 Parts contain Phlog. 67—Fixed Air 23—Iron 10—It does not strike Fire with Steel. The Trace it leaves on Paper is of a darker hue than that from Mollibkeny, which is also silvery. (a) PENCILS are fawed out of the solid Substance, to their due dimensions. A bad kind is made of the Powder, mixed with Sulph. and some mucilaginous Substance, worked into a Paste. (b) CRUCIBLES, and PLASTER to coat Reorts. 1 Plomb. 3 Clay, and some Cow's Hair, kneaded together to a due consistence. Uted also to cover Razor Straps; give a shining surface to cast Iron-work and Shot; and to smooth the surfaces of Wood-works, which are to rub on each other.	1.087 to 2.267	WATER—mixes with it; (1) and Springs are impregnated with it in many places; communicating a flat, Sug. of LEAD. MERC. dissolved by Nit. Acid. COPPER solutions, and those of MART. VITRIOL produce no change. ARSENIC is precipitated from its solutions in a (2) Powder resembling Opium.		(4) Calcination of Metals.
HEPATIC AIR is obtained artificially from Liver of Sulph. whether the Bate is Alk. Earth or Metal, as containing sufficient Phlog. and not too strongly attracting that of the Hepar. Alk., by distilling a mixture of Sulph. and Charcoal, or Oil.		ACIDS—VIT. Mur. and ACET. do not precipitate its Sulph. NIT. and DEPHLOG. Mur. do. METALS—Tin, Bism. Reg. of ANT. and ZINC, are not affected by this Air. COPPER and IRON Lime is not precipitated by it from Lime Water, unless its proportion is very great. NITRE—takes up about $\frac{1}{4}$ its bulk of this Air; and, when saturated, turns Silver Black.		(5) Vital Heat.
		AIR or WATER, after long exposure of this substance to them do not alter it. HEAT—of a strong Furnace is nearly incapable of altering it, and in which it resembles Charcoal; but, by continued ignition and stirring, in a shallow Vessel, under a Muffle, it is gradually diffipated or burned, leaving about $\frac{1}{10}$ of the original weight of Calx of Iron. FLUXES—of the usual kinds, do not effect its fusion. NITRE—mixed with it in a red hot Crucible, decomposes it with detonation; but it m. ft. be in th. proportion of 10 to 5; whereas, Charcoal requires only 5 parts of Nitre, by which it is <i>oppressed</i> ; at Plomb. Nitre is driven up by the Heat; and the Acid is dissolved; no indication remains proceeded from the Plomb. and not from the Nitre. ACIDS—are not capable of dissolving it. ALKALIES—CAUSTIC distilled with it in a strong heat produce Infl. Air. MET. SUBST.—will not combine with it; but it may be intercepted between the Particles of IRON, which it is <i>always found united</i> . CALCES are not reducible by it alone; but, like Charcoal, it must be mixed with Alk.		(6) Fire Damp.
		HEAT—produces from it a Blue Flame, and smell of Grease; leaving a black viscid matter, not easily consumed. EXPRESSED—dissolve it when boiling.		(7) Aerial Acid or Fixed Air.
		HEAT—of a moderate degree, softens it so as to stick between the Teeth; an open Fire consumes it. In distillation it yields the same principles which are had from Bitumens, viz. Acid Sp. Concrete Acid Salt, some Oil, and a Charry Refiduum.		(8) Pyrophorus.
		OILS and AER. Sp. in the proportion of 12 to 1, and in a boiling heat, dissolve it.		(9) Nitrous Air.
		HEAT—in a lower deg. than causes Merc. to boil, melts it; defroying its transparency, and producing a fragrant smell. On burning Coals it gives a whitish Flame and white-yellow Smoke, electric and leaves brown Albes. By friction it becomes gentle Fire it yields some Water, and a peculiar (1) concrete Acid.		(10) Muriatic Air.
		ACIDS—VIT. alone dissolves it, and the solution is reddish purple, precipitable by Water. NIT. 100 gr. are neutralized by 75 of Amber; 100 gr. of which, therefore, appear to contain near 90 of Phlogiston. AER. Fixed—is incapable of dissolving it. OILS—essential or expellid, require some decomposition, or long digestion, to be enabled to dissolve it. BALSAMS dissolve it readily. AER. Sp.—or WATER cannot dissolve, although the 0 mer. calces from it a reddish tinge.		(11) Pyrophorus.

SULPHUR

COMBINED with

AERIAL ACID

100 Parts contain Phlog. 67—Fixed Air 23—Iron 10—It does not strike Fire with Steel. The Trace it leaves on Paper is of a darker hue than that from Mollibkeny, which is also silvery. (a) PENCILS are fawed out of the solid Substance, to their due dimensions. A bad kind is made of the Powder, mixed with Sulph. and some mucilaginous Substance, worked into a Paste. (b) CRUCIBLES, and PLASTER to coat Reorts. 1 Plomb. 3 Clay, and some Cow's Hair, kneaded together to a due consistence. Uted also to cover Razor Straps; give a shining surface to cast Iron-work and Shot; and to smooth the surfaces of Wood-works, which are to rub on each other.

MINERAL TALLOW

AMBERGRIS

The Juice of the Tree Cuna infiltrated by evaporation into a concrete form; washed by Rain into the Rivers, and carried into the Sea, where it is initially found. The Small is fragrant, especially when it is burnt.

VEGETABLE

AMBER

100 gr. contain Petrol. 72.0—Succin. Acid 1.065 to 2.35. 4-5—Fixed Matter and Water 2.35. A Retinous Substance, probably altered by Vit. Acid from contiguous Pyrites, being frequently found in the Earth, in the neighbourhood of Fossil Wood. It often encloses Insects. Is capable of being softened, and two pieces united together, being heated and washed with Oil of Tart. FICTITIOUS AMBER—Type up in a fine Mullin Bag the Yolk of an Eggs carefully freed from the White, and suspend it in a warm situation. In about a month it will acquire the appearance and some of the qualities of Amber; becoming hard, transparent, electric, and capable of a fine polish. Amber is employed in making Cane Heads, Beads, various Trinkets, and Varnish.

COPAL

Similar to Yellow Amber: generally employed in making Varnish. COPAL VARNISH—Pour 2 quarts of highest rectified Sp. of Wine on 1 pound of the Gum, dried and powdered; to which add 8 oz. of Oil of Turpentine, and shake the Mixture constantly for 6 hours; let it then remain 2 days, shaking it sometimes; and, lastly, suffer it to settle, and pour it off clear for use. (a) With this Laccets or Plans may be preserved.

HEAT—in distillation, produces from it no Acid Salt;—the other Chemical Products are much as those from Amber.

GUM COPAL (vulgo, being a Resin.) Copal Varnish. (a) Insects preserved.

United with OLEAGINOUS

Thin	Liquid	Thick	Viscid	Elastic	Pitchy	Fossil Pitch	Hardened	Electric
Thin, transparent, volatile, inflammable, and so light as to swim on Water. Small, agreeable, but unlike that of Veget. Oils.	Small like Oil of Turpentine or Amber, but pla- saunter. Flavour of a penetrating Shaperep. Thick as Infused Oil, and lighter than Sp. of Wine. Differs from Naphtha, as containing more Acid.	Inodorous, and more or less disagreeable, particu- larly when burned. Viscid, resembling Pitch.	Rembles in col. and elasticity the Gum Resin called Indian Rubber, and wipes away Traces of Black-Lead.	Smooth, hard, brittle, shining, lighter than Water, inodorous; (a) from which, or the last, the Egyp- tians probably prepared Asphaltum for embalm- ing dead Bodies.	Of a mean consistence between Asphaltum and Petrol. Employed by Arabs in paying Ship's Bottoms.	Compaq. harder than Asphalt. like Amber, electric; lighter than Water. Never found in Strata. Employed in Toys, making black Varnish, and a hard Cement with Lime.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.
Air—changes its colour in time, and it thickens into Petroleum. HEAT—enflames it as easily as it does Ether, with a Bluish-Yellow tinge. Does not decompose it in distillation, but makes it volatile. GOLD is attracted by it out of Ag. Reg. as it is by Ether. RESINS and BALAMS—are attracted by it, but not Gum Resin or Elastic Gum. Essent. Oils of Lavender and Thyme dissolve it: A.R.D. Sp. or ETHER—not.	HEAT of Fire readily enflames it. Distillation purifies it, leaving a resinous Residuum. Vol. Alk. added acquires the properties of facinated Alum. and contains Acid of Amber. Sp. or WINE—will not dissolve it.	HEAT—melts it with much Smoke and Soot, leaving Ashes, or a Slag, proceed- ing from heterogeneous Matter. Alk. Min.—produces with it a Salt less soluble than com. Salt, and, which, treated with Charcoal, will not yield Sulph. a proof that it contains Sulphur Acid. Sp. or WINE—will not dissolve it.	FIRE—burns it with a smoky Flame, and melts it into a thick oily Fluid, with a disagreeable smell.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.	HEAT—burns it, leaving no Ashes if pure, otherwise Ashes or Slag; and melts it easily. ALCOHOL and ETHER act slightly and partially upon it.
White. Reddish. Green, deep. Black, when old.	Lightest Yellow. Red. Black or Heaviest brown.	Brown. Black. Red-black.	Brown, dark, or yellow.	Brown, dark or yel. Looked through, Red.	Black. Glossy.	Black. Glossy.	Black. Glossy.	Black. Glossy.
NAPHTHA.	PETROLEUM.	BARBADOS TAR.	RUBBER.	ASPHALTUM. (a) Mammia.	PIASPHALTUM. (1) Red-oil.	JET. Black Amber.	SWINE-STONE. LIVER-STONE. Hepatic Stone.	CAULM.

United with ARGILLACEOUS

In greater quantity and Vit. Acid	In small quantity	In great quantity	In a loose state	In great quantity	And Pyrites in great quantity.
100 Parts cont. 17 of Earth, of which 4 are Martial. It is erroneous to give to the finals of all kinds of Coals the name of Culm, which is applicable only to this kind. Culm is useful in burning Lime, baking Bricks, and as a Flux for Copper Ores.	Contains Petrol intimately mixed with the Earth, and sometimes Pyrites, in which circumstance alone Sulphur is found in it. Solid, brittle, inflammable, and not electric. Rarely fusible of a polifil. Note. The Liquid Products, obtained by distil- lation from Coals, are wholly of the same qua- lities with those from Wood, differing only in their proportions.	Does not fall the Fingers. Breaks in any direction. Resembles Jet when made into Toys.	Contains of Earth not more than 1/20. Used, in its crude state, to dry Mail.	1,400 FIRE—burns from it very little Flame or Smoke, and it burns more in- tensely and slowly than other Pit-Coal. The Vapours are suffocating like those of Charcoal.	1,500 AIR—occasions it to moulder, in which state it is acted upon by Water, which generates heat, and sometimes inflammation. FIRE—produces from it red hot Ashes, or a Slag, or both, and a sulphurous smell.
Appears like Slate.	HEAT—does not incline this to Fuse or Coke, as it does Pit-Coal, nor con- sumes it; but, instead of Ashes, a Slag remains almost as large as the Volume of the Coal. <i>Thaps readily dissolving the two kinds.</i> In distillation, the best kind sends over Fixed Air, Acid Liquor; Inflamm. Air; Oil, light, like Petrol; Vol. Alk. and Fossil Oil: the Residuum is nearly 1/2 of the whole; and, being slowly burnt, affords 80 per cent. Ashes, mostly argillaceous, a part of which is magnetic.	FIRE—burns it by itself, with a Flame and disagreeable Smell. In distillation it yields a quantity of Petrol equal to its bulk. SILVER—is tarnished by the Smoke of Pit-Coal, in consequence of the Vic. Acid contained in greater or lesser quantity in every kind; which gives it the action of Sulphur, although ever so free from Marcalite.	FIRE—burns this with a lively Flame, during which it is apt to fly in pieces, unless previously immersed in Water.	HEAT—burns it by itself, with a Flame and disagreeable Smell. In distillation it yields a quantity of Petrol equal to its bulk. SILVER—is tarnished by the Smoke of Pit-Coal, in consequence of the Vic. Acid contained in greater or lesser quantity in every kind; which gives it the action of Sulphur, although ever so free from Marcalite.	HEAT—burns it by itself, with a Flame and disagreeable Smell. In distillation it yields a quantity of Petrol equal to its bulk. SILVER—is tarnished by the Smoke of Pit-Coal, in consequence of the Vic. Acid contained in greater or lesser quantity in every kind; which gives it the action of Sulphur, although ever so free from Marcalite.
SLATE COAL.	CAULM.	CANNEL COAL.	BLIND COAL. Kilkenny Coal.	SULPHUREOUS COAL.	COAL TAR. Pitch. (a) Coal Varnish.

United with EARTH

of Wood with Bi- tumens	of Herbage	of small Roots and Branches, Grats, &c.	of Wood with Bi- tumens	of Herbage	of small Roots and Branches, Grats, &c.
Confists of Wood penetrated with Petrol. or Bitu- men, and frequently contains Pyrites, Alum, and Vitriol.	Confists of Fibrous Roots of Herbage, with Argill. Calx, and Pyrites. Of viscid consistence, when fresh dug.	Confists principally of Twigs, Roots and Leaves of Trees, Grats and Woods. When compact is an excellent durable Fuel. Less compact contains more Mould; and that kind with bulbous Roots is the weakest Turf.	Confists of Wood penetrated with Petrol. or Bitu- men, and frequently contains Pyrites, Alum, and Vitriol.	Confists of Fibrous Roots of Herbage, with Argill. Calx, and Pyrites. Of viscid consistence, when fresh dug.	Confists principally of Twigs, Roots and Leaves of Trees, Grats and Woods. When compact is an excellent durable Fuel. Less compact contains more Mould; and that kind with bulbous Roots is the weakest Turf.
Air—hardens the Laminæ, which are usually flexible when fresh dug.	Air—condenses it, so as to become Inflammable. HEAT—produces from it by distillation Water, Acid, Oil, and Vol. Alk. The Ashes (white, sometimes red when impregnated with Iron) yield Fixed Alk.	Air—first hardens and then disposes it to crumble. FIRE—applied, as in cooking of Coals, produces from Turf a (1) Char, which yields a pure welding heat in the Forge, and is capable of melting Cast-Iron.	Air—hardens the Laminæ, which are usually flexible when fresh dug.	Air—condenses it, so as to become Inflammable. HEAT—produces from it by distillation Water, Acid, Oil, and Vol. Alk. The Ashes (white, sometimes red when impregnated with Iron) yield Fixed Alk.	Air—first hardens and then disposes it to crumble. FIRE—applied, as in cooking of Coals, produces from Turf a (1) Char, which yields a pure welding heat in the Forge, and is capable of melting Cast-Iron.
Lamel. Black. Yel. brown.	Brown, Yel. brown. Black.	STONE TURF. (1) Charred Turf. COMMON TURF.	Lamel. Black. Yel. brown.	Brown, Yel. brown. Black.	STONE TURF. (1) Charred Turf. COMMON TURF.

MAGNESIAN

Combined with ACID of

SEA SALT

AIR

100 Parts cont. Magn. 19—Vit. Acid 24—Water 57.

Tafle is very bitter. *Figure* a square column.

Obtained by evaporation from certain Mineral Springs; or from Bitumen of Sea Salt, evaporated and crystallized.

Distinguished from Glauber Salt by adding to its solution Lime Water, which will precipitate Selenite; but would have no effect with Glauber.

100 Parts cont. Magn. 27—Nit. Acid 36—Water 37.

Tafle acrid and very bitter.

Obtained from the Mother Liquor of Nitre.

Found in the Sea in greater plenty than any other Salt except Sea Salt; and is the cause of the bitterness in Sea Water.

Tafle very bitter and acrid.

This is a Neut. Salt, only when there is an excess of the Acid, which qualifies it to dissolve in Water.

WATER—diffuses it; being very deliquescent.

HEAT—occasions it to swell; but produces no detonation.

ACIDS—VIT. or AER. do not affect its solution, but it gives a precip. with Nit. Selenite.

ALK. and EARTHES POND. or CALC. decompose it.

WATER—diffuses it in small quantity. It is deliquescent.

ACIDS—VIT. NIT. or BORAC. expel the Mur.—its solution does not affect that of Nit. or Mur. Selenite; but clouds that of SILVER in Nit. A.—VIT. produces from it no Precipitate.—A red heat expels the Acid.

ALK.—even the *Caustic* Vol. and Lime precipitate its Salt.

HEAT—expels the Acid and Water, rendering it phosphorecent, and agglutinates it.

ACIDS MIN. and ALK. all dissolve it with effervescence.

Acrid Magnesia.

Nitrous Epsom Salt.

Muriatic Magna.

Vitreous Magnesia, Epsom Salt, or Selenite.

(1) Mild Magnesia.

BASIS of

ARGILLACEOUS combined with

VITRIOL

PURE

SEA SALT

100 Parts cont. Argill. 18—Vit. Acid 24—Water 58.

Tafle sweetish, astringent, and very astringent.

Its Basis is the purest Clay yet discovered.

ALUM is extracted from Shale, Pyrites, or other Alum Ores, by calcination (which is not necessary always, and must be moderate) and long exposure to Air. The Acid of the Sulphur, by this means, unites with the Clay. This combination steeped in Water mixed with Alk. Ley, or putrid Urine, and the Water left to evaporate, floats into Crystals; 1 ton of which is produced from 120 of Shale.

Used in Tanning, Drying (by opening and cleansing the Pores to receive the Colour); is the Basis of Ceyrons; mixed in Milk promotes the separation of the Butter; renders limpid turbid Water, without bad taste or quality; added to Tallow makes the Candles harder; Paper impregnated with it used in whitening Silver, and silvering Brass without heat; Wood or Paper soaked in it are less susceptible of Fire, &c.

100 Parts cont. Argill. 42—Argill. 50—Veg. Alk. and Iron 8.

Sulphurated Clay—contains Subp. 42—Argill. 50—Veg. Alk. and Iron 8.

Pyritaceous—contains Clay, Pyrites, and Bitumen.

Silicious Alumina—contains Petrol and Pyrites intimately mixed with it.

Bituminous Alum Ore. Found in Coal-Mines.

Found only in Nevil Hot Water.

2.071

AIR—affording Pabulum to the Phlog. inflames some of the Alum Ores, which resemble Clay.

WATER—cold, 15 times its weight, boiling, 2 dissolves it.

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BASIS of METALS

IRON with ACID of

VITRIOL

SEA SALT

100 Parts contain Iron 25—Vit. Acid 20—Water 55.

Tafle harsh, astringent, and acidulous.

GREEN VITRIOL obtained by pouring on Iron Filings an equal weight of Vit. Acid, and twice as much Water, or more [Ind. Air is discharged during fol. and subject to take fire from the blaze of a Candle.] After solution more Water is poured on, and the whole filtered, evaporated, and left to crystallize.

The Acid is capable of dissolving more Iron repeatedly; so that 3 lb of Vitriol may be made by 1 lb of Acid.

from Ziment Waters, after the Copper has been precipitated by Iron. If the whole of the impregnated Water could be evaporated for this purpose, 100 ton of Iron would yield 200 of Vitriol.

from the Shaly Pyrites, Ink-Stone, &c. by exposing them to the Air one or more years, in Beds, on a flammish sloping Floor. A spontaneous heat, which it acquires, dissipates the Ind. Principle of the Sulph. and the dissipated Acid uniting with the Iron of these substances, forms the Vitriol; this, dissolved by rain, runs down the Floor into a Lead Pan, into which some old Iron is thrown to saturate the Acid, and purify the Salt from Copper. When boiled to a proper consistence it is let off into Coolers to crystallize; and yields sometimes $\frac{3}{4}$ of the weight of the Salt. Some Ores require to be burnt.

(a) Black Dye for Cloth is made with Green Vitriol and some astringent Vegetable. And Writing Ink in the same manner.

(b) Found in light Chalky Waters, but very seldom.

(c) FACTITIOUS CHALKY WATER. Infuse 2 drops of Mur. Acid, saturated with Iron, in a pint of Water, and add 3 grains of Salt of Wormwood.

Found native in Cobalt Mines.

COBALT VIT. made by distilling the Metal with Vit. Acid nearly to dryness, dissolving the compound with Water, and precipitating the Powder with Lime or Alk.

100 Parts contain Zinc. 20—Vit. Acid 22—Water 58—

Tafle very styptic.

WHITE VITRIOL made by dissolving Zinc in diluted Vit. Acid. Much Ind. Air escapes, and the undissolved residue is Phosphog. Water being added, and the whole filtered, and let to rest, produces fine prismatical 4-sided Crystals.

made at Goda, from Ore, containing Zinc, Copper, and Lead, mineralized by Sulph. and some Iron. The Copper being precipitated by Iron; the remainder torrefied, is cast into Water, lixiviated, and left to crystallize.

2.000

AIR—changes its colour to rusty yellow-blue.

WATER—*temperata*, 4 times the weight dissolves it.

HEAT—deprives it of most of the Water; and reduces it to a whitish-blue Powder, nearly decomposing it by expelling the Acid. Excited, makes it froth with noise, and a green flame and the Metal. Particles are often reduced to a Copper Globule, leaving a reddish Calx or irregular Scoriae: BORAX dissolves these and forms a green Glass.

ALK. FIXED—precipitates Copper from a solution of this Salt in a blue Powder, which drying, becomes green. Vol. a whitish blue, which turns to a deep blue.

NEUT. VIT. SALTS—mix with it uniformly.

VEGET. ASTRINGENTS—Tinct. of Tea, Quinquina, Galls, precipitate it (2) black or dark-blue, and are used as tests to discover Iron in solutions. Infusion of Heart of Oak produces with it a (3) virid blue.

Acid—Nit. causes with it effervescence, and produces a green colour.

SILVER—solution added, forms Luna Corna; detecting the Mur. Acid.

AIR—causes its efflorescence, and a rusty yellow colour.

WATER—*temperata*, 6 times its weight dissolves it.

HEAT—*moderata*, reduces it to Powder, yellowish, suddenly applied to melt it, on cooling it becomes whitish-brown. Exposed to evaporate the Acid, it is (1) dark-red. The Black Calx or irregular Scoriae: BORAX dissolves these and forms a green Glass.

ALK. FIXED—pure, precipitates the Iron from its solution of a deep green colour. Acrid, greenish. Vol. pure, black-green. Acrid, grey-green.

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NICKEL with ACID of VIT.

GREEN VITRIOL OF NICKEL, made by corroding the Reg. with Vit. Acid; distilling; dissolving the grey Powder which remains in Water; evaporating and crystallizing.

MANGANESE with ACID of VIT. or SEA SALT.

MANG. SALT may be made by dissolving the Reg. in Mur. Acid, in a digesting heat, some hours. By evaporation a Saline Mass, soluble in Aq. Sp. is obtained; seldom Crystals. (a)

WATER—diffuses Iron only when it contains an excess of Aer. Acid; this flying off leaves a Pellicle of Iron on its surface, tinged with various prismatical colours, according to the various degrees of tenuity, or states of dephlogistication of the Metal Particles.

HEAT—applied to evaporate ferruginous Min. Waters, dissipates the Fixed Air; and the weight of the Water; retaining sufficient Phlogiston to obey the Magnet.

AIR—causes its efflorescence, in which state it is found.

WATER—diffuses it with difficulty; the fol. is red.

ALK.—phlogisticated, gives a Precipitate, which melted with BORAX—produces an Azure Glass, exposing the Cobalt.

WATER—twice its weight dissolves it; and deposits Heavy Cryst. White.

HEAT—dissipates part of the Acid. With the Blow-pipe it exhibits the same Phenom. as other Met. Vitriols, except that when the Zinc is reduced, a brilliant Flame and white Flocks ensue.

ALK. and EARTHES—precipitate a White Powder from its solution.

VIT. SALTS—mix uniformly with it; and Nit. and Mur. Selenites are precipitated from their solution by it.

IRON, COPPER, or ZINC do not precipitate it.

ZINC—precipitates it; but when joined with Iron the Zinc does not affect it.

Efflorescent—Greenish.

VITRIOL OF NICKEL.

MANGANESE SALT.

(a) Muriatic Manganese.

WATER—is attracted by it from the Atmosphere.

ALK. MIN.—precipitates a brownish yellow Powder.

PRUSSIAN—a whitish yellow.

Hand. S. trans. Blue.

VITRIOL OF COPPER, BLUE VITRIOL, or Blue Stone.

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PURE

100 Parts obtain Phlog. 40—Vit. Acid 60
Tellur. Small suffocating when heated; and
 its Flame Blue.
 (a) Found in Veins in Rocks; in Gypsum in lumps;
 and crystallized in Lame-flone, into octahedral
 Prisms; in Mineral Waters in form of Needles,
 3 lb of Water containing 25 grains of Sulph., and
 in other Substances.
 (b) Stone Brimstone is obtained from Pyrites
 by melting them in Earthen Crucibles, disposed in
 such a manner in a Furnace, that when the full
 phreous part melts, it runs into Vessels filled with
 Water, and there congeals.
 or from Sulphureous Cop-
 per Ores, burnt in large close Kilns, from whence
 the Vapour is conveyed by a Tunnel into a great
 Chamber, where it is condensed.
 (c) This is frequently adulterated with Arsenic,
 No cheap method has yet been discovered for sepa-
 rating them.

(a) FACTITIOUS SULP. Eg. parts Fixed Alk. and
 Vit. Tartar, and $\frac{1}{4}$ of the whole of Charcoal heated
 in a Crucible: the Hepar formed is cast on a Mar-
 ble galled, diffused in Water, from which Sulph.
 is precipitated by any Acid.
 (c) LIVER or SULP. field—*The dry method.* Equal
 parts Caust. Alk. and Flowers of Sulph. melted in a
 Crucible and poured on Marble. *The Humid way*—
 Soap Lye with half its weight of Sulph. heated to red-
 ness and filtered.

(f) FLOWERS OF SULP. The Sulph. put into an
 Earthen Crucible on a Sand Bath, with a Head
 properly adapted, rises by a very gentle heat, little
 more than sufficient to melt it, in a fine sublimate.
 the Vapour received in a close Chamber is found in
 Flowers.

SYMPATHETICK INK—1 oz. Opiment in Powder, 2
 clear Liqours, which contains Hepatic Air extracted from the
 writing and a fat substance moistened with this solution.
 (g) Sugar of Lead, used in recovering four Wines, and rancid Oils, is detected by this probatory Liqour; one drop of which will give to a Glass of Wine to
 GUNPOWDER—weak.
 Salt Petre.....66 $\frac{1}{2}$ lb
 Sulphur.....16 $\frac{1}{2}$ lb
 Charcoal.....16 $\frac{1}{2}$ lb

as these two do, being mixed together; however it probably does exercise the power of the Powder.
 Various other proportions are used in different countries.
 Moisture, which it is apt to attract from the Atmosphere, if the Nitre is impure, decomposes it; a degree of heat less than that in which the Powder explodes,
 viz. 600° may be safely applied to dry it.
 Analyzed. Boil gently 4 oz. of the Powder ground fine, and well dried, in a quart of distilled Water; pass the solution through filtering Paper, adding
 Water till insipid; evaporate gently to dryness to obtain the Saline Matter. Distill this in hot Water, and then evaporate slowly, and remove the Crystals of Com-
 Salt (if there should be any) whilst the Water is hot; when cool the pure Nitre will crystallize; and if any remains not crystallized after due evaporation, it is
 Mother of Nitre, which is very deliquescent. What remained in the Filter evaporated on a Plate of Copper, the Sulphur is dissipated, leaving the Charcoal; a small
 PULVIS FULMINANS—3 parts Nitre; 2 Salt of Tartar, or White Flux; 1 Sulphur, well triturated together, and quickly put into a Bottle.
 OIL OF VITRIOL is produced from Sulphur by mixing with 8 parts of Sulphur 1 of Nitre, in a proper Vessel, enclosed in a Chamber of considerable
 size, lined on all sides with Lead, *so close as not to admit the escape of the Volatile Matter which rises*, having a shallow stratum of Water covering the Bottom, *so condense*
and imbibes the Acid, and setting the mixture on fire. By such Combinations repeated, the Water becomes strongly impregnated with the Acid; which is afterwards
 concentrated by distillation. (See Acids—Vit. Dr. Ward's Process.)

Contains from $\frac{1}{2}$ to $\frac{3}{4}$ Sulph. and from $\frac{1}{4}$ to $\frac{1}{2}$ Calc of
 Iron.
 Is the kind generally used for the extraction of Sulph.
 The crystallized comes sometimes from Mines pro-
 ducing Plumbago, and contains Gold.

PHOSPHORUS is now made by pouring diluted Vit. Acid, less than sufficient to dissolve it, on Bones calcined and powdered; evaporating the clear Liqour in a
 Copper Vessel to the consistence of Honey; then adding its weight of powdered Charcoal, and distilling in an earthen Retort, the Neck of which being immersed
 in a small depth in Water, the Phosph. as it comes over will fall to the bottom in drops. This ended, it must be suffered to cool, and the Mass (resembling Yellow
 Wax) may be pressed, under the Water, by the hand; or moulded in conical Glass Tubes, by heating the Water to melt it.
 Purified by distillation; or finishing it through Leather in hot Water.
 Was formerly made from Urine, by a very tedious Process.

Refinable Pit Coal.
 Yields about 30 per cent. of Iron.
 Harder than Pitch.
 Metal has never been extracted from this kind; not-
 withstanding the effects produced by Borax and the
 Loadstone.

BLEACHING LIQUOR—To a tubulated Retort charged with 1 $\frac{1}{2}$ lb of black Manganese, in Powder, 4 of Com. Salt, 3 of Vit. Acid, and 1 quart of Water; fit a
 Receiver containing 4 gallons of caustic Veg. Alk. Lye; dilute with a heat gradually raised to 140°, about 24 hours; the Receiver, taken off and quickly corked, must
 be violently shaken, to incorporate the Gas with the Lye. If the fire was too great some common Mur. Acid will pass over, and form a Salt of Silivius,
 Diluted with 30 times its quantity of Water, this Liqour whitens grey Linens; discharges the colours from printed goods; and bleaches Bees, and perhaps
 Myrtle Wax.

MARINE NITRE—If *Mild Alk.* is used in the foregoing Process instead of *Caustic*; the Lye, saturated with the Mur. Acid, becomes dephlogisticated, deposits this Salt
 in form of Scales, or of Prisms, Crystals.
 These Scales, or Crystals, gently triturated with Flowers of Sulphur, fulminate with a brilliant Flame.
 This Salt would make powerful Gunpowder, was it not too irritable to be ground with safety.

PRUSSIAN ALKALI—Ox Blood and Veg. Alk. of each 4 lb. are calcined together until flame and smoke cease, and then kept red hot 2 hours; this is boiled in 2 gallons
 of Water, until half is consumed; then filtered, and 2 gallons of Water poured on the residuum, and boiled away to half. The two Waters being mixed together
 are then boiled down to 2 quarts of this Lye.
 For chemical purposes is also made by boiling the Alk. upon Prussian Blue ready formed.

PRUSSIAN BLUE—To the 2 quarts of the foregoing Lixivium, poured hot into a large Iron Pan, is added the mixture of a filtered Solution of 1 ounce of Copperas
 in 6 of Water, and of 8 ounces of Alum in 2 quarts of hot Water; and the Liqour is poured from one Vessel into another until effervescence ceases, and the Froth
 goes off, and then strained through a fine cloth. On the Ash-coloured Sediment is poured 2 ounces of Spirit of Salt, which changes it to a fine blue, on which
 Water is poured, and, when settled, decanted; this is repeated until it comes off insipid, and the Powder is dried. Calcined it becomes (a) red, and magenta;

BLACK INK—To a Decoction of 4 ounces of Aleppo Galls and 1 Pomegranate Rind (powdered, steeped 8 days in Water, and boiled in 2 quarts of Rain Water
 until one third is consumed) add a Solution of 2 ounces of Gum Arab. in half a pint of White Wine, and 1 ounce of Copperas; stir the mixture while boiling;
 and when taken off the fire, shake it till cool. Let it settle 3 days, and strain it off.
 Decayed Writing is restored to legibility by infusion of Galls or gallic Acid; but best by spreading thinly over it a Solution of Prussian Alk. and tracing *Decayed Writing restored.*

AIR—Indian, passed through it whilst in fusion is converted into H₂S
 Air, which is decomposed by Vit. Acid.
 WATER—does not dissolve, but by long trituration is diffused through
 it in part.
 SP. OF WINE—dissolves it only when both are in a vaporous state.
 72 parts Sp. will then take up only 1 of Sulphur.
 OILS—hot, dissolve it; forming various (1) Compounds.
 HEAT—at 170° evaporates it gently with a blue Flame, visible only in the dark. At 185° melts in giving a
 red colour, but on cooling the proper colour is restored. At 302° burns it with a more luminous Flame, and
 suffocating Vapour; subliming it without decomposition into (2) Flowers in close Vessels; but in the open
 Air, or by communicating Vit. Acid, the Phlog. flies off, leaving the (3) Acid pure.
 ACIDS—Vit. partly decomposes and partly dissolves it. NIT. dephlogisticated has the same effect; but
 concentrated and boiling with it decomposes it entirely.
 ALK. FIXED—caustic, forms with it (4) a Mass, most permanent and of difficult decomposition. When made
 the dry way, and dissolved or moistened with Water, a permanently (5) Effluve Fluid is emitted of a most
 fetid smell, and fatal to animal life; soluble in Water which it converts into a state resembling sulphureous
 Min. Springs. It renders Syr. of Violets green; tarnishes the surface of Silver; and blackens the Calces
 of Bismuth, and of Lead; *may therefore be applied to detect Lead in Liquids.* Earths, or saline earthy sub-
 stances, have no effect on the Hepar; but Acids precipitate from it a (6) white Powder, disengaging Hepatic
 Air. If the Alk. is combined with Fixed Air the Liver will be less strong. V.O.L. has little effect on it,
 but the ALK. AIR, being united with Vapour of Sulph. a reddish yellow (7) Hepatic Liqour is obtained,
 which emits white Fumes.
 EARTHS—Calc. unites with it readily; a little Water added produces heat enough to promote the combina-
 tion; more Water, (8) the Compound has the colour of rotten Eggs, and a fetid smell: Fixed Alk. decom-
 poses it, and Acids precipitate a Magistery. MAON. enclosed with an equal quantity of Flowers of Sulph.
 in a Vessel filled with distilled Water, and immersed in boiling Water several hours, the Water will contain
 a (9) Liver. POND. boiled with it in Water has little effect; but Pond. Sp. or its combination with
 Vit. Acid, strongly heated in a Crucible with it and some Charcoal, a (10) subvent Magt is formed, soluble
 in Water, and possessing Hepatic characters. SILIC. does not appear to be acted upon by it. ARGILL.
 METAL. SUBST. SILVER, COPPER, and IRON are tarnished by it, imbibing from its effluvia too large a
 proportion of Phlog.

BRIMSTONE:
 SULPHUR.
 (1) Balsams of Sulph.
 (2) Flowers of Sulph.
 (3) Oil of Vitriol.
 (4) Liver of Sulphur.
 (5) Hepatic Air.
 (6) Magistery of Sulph.
 (7) Volatile Hepar.
 (8) Furning Lye of Boils.
 (9) Calcareous Hepar.
 (10) Magistery Hepar.
 (11) Ponderous Hepar.
 (12) Native Brimstone.
 (13) Stone Brimstone.
 (14) Purified from Arsenic.
 (15) Partitious Sulph.
 (16) Liver of Sulph.
 (17) Flowers of Brimstone.

ANALYSIS OF GUNPOWDER.
 SYMPATHETICK INK OF
 Opiment.
 (a) Lead detected in Wines
 or Oils.

GUNPOWDER.
 100 100 100
 75 lb 12 $\frac{1}{2}$ 10
 12 $\frac{1}{2}$ 10 10
 16 $\frac{1}{2}$ 10 10

HEAT—promoted by moisture, and the action of the Air inflames it;
 and then it continues to burn of itself.
 This is probably the cause of subterraneous fires.
 Moderate heat expels the Sulphur.

HEAT—having once inflamed it, reduces it to Ashes; from which Copper may be melted.
 HEAT—of Fire burns this with a languid but quick Flame; lessening none of its bulk,
 and little of its weight.
 HEAT—of an open Fire does not alter it; volatilizes the greatest part under a muffle,
 a small quantity of Iron Calc remaining, first of a yellow-red, and then reddish-
 brown. BORAX melted with it is a little discoloured, and the MAGNET attracts it.

ADDENDA to SALTS. PROCESSES omitted in their proper Places.

PRUSSIAN ALKALI—Ox Blood and Veg. Alk. of each 4 lb. are calcined together until flame and smoke cease, and then kept red hot 2 hours; this is boiled in 2 gallons
 of Water, until half is consumed; then filtered, and 2 gallons of Water poured on the residuum, and boiled away to half. The two Waters being mixed together
 are then boiled down to 2 quarts of this Lye.
 For chemical purposes is also made by boiling the Alk. upon Prussian Blue ready formed.

BLACK INK—To a Decoction of 4 ounces of Aleppo Galls and 1 Pomegranate Rind (powdered, steeped 8 days in Water, and boiled in 2 quarts of Rain Water
 until one third is consumed) add a Solution of 2 ounces of Gum Arab. in half a pint of White Wine, and 1 ounce of Copperas; stir the mixture while boiling;
 and when taken off the fire, shake it till cool. Let it settle 3 days, and strain it off.
 Decayed Writing is restored to legibility by infusion of Galls or gallic Acid; but best by spreading thinly over it a Solution of Prussian Alk. and tracing *Decayed Writing restored.*

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

PRUSSIAN BLUE.
 (a) Prussian red.
 WAITING INK.

METALLIC

The heaviest of all Bodies hitherto known. Their Specific Gravity exceeding 5,000. So opaque as not to admit the Sun's Rays to pass through their thinnest Leaves. Consisting of dull, brittle Earths, combinable with Phlogiston: and whilst combined, having a shining appearance.

METALS

That Species of Metallic Bodies which is distinguished by the property of Malleability. Their Crystallizations always approach to the Pyramidal Form.

Qualities and Application.	Sp.Gr.	Affinities.	Texture.	Colour.	Contents.
<p>The Heaviest of all known Bodies, Platina excepted. Most Tough 19.640 and Ductile of all Metals; 1 gr. of its leaf measuring 56.718 Sq. In. Softer than any except Lead, therefore little Elastic, or Sonorous. Most Cohesive; its wire $\frac{1}{16}$ of an Inch Diam. sustaining 500lb.</p> <p>Requires an alloy of some other Metals, to harden it for most uses.</p> <p>(a) STANDARD GOLD, of England is 11 P^{wt} fine gold, and 1 of Copper; or of Cop. and Silver; 1lb. of 12 oz. of this is coined into 44½ Guineas. Hence when the price of an oz. of Stand. Gold is £3. 17. 10½, that of fine Gold is £4. 4. 11½.</p> <p>(b) A gross Judgment may be formed of the proportion of Gold in Metals, by rubbing the Compound on the Touch-Stone (<i>Lapis Lydius</i>) and applying to it a little Aq. Fort. which will destroy the Traces of all Metals except Gold. Or by comparing the Colour it gives on the Touch-Stone, with that made by Needles, (Bars of Gold with various proportions of Alloy) prepared for such purpose. But most accurately by finding the Sp. Gr.; and calculating, from the deficiency of weight, the proportions of Gold and Alloy. Platina, which is heavier than Gold, and might even entertain a portion of Base Metal without diminishing the Sp. Gr. would baffle this Test; but a very small addition of Platina, even $\frac{1}{12}$ part, takes away the colour of the Gold.</p> <p>(c) GILDING on Silver is performed by coating the Silver with Leaves of Gold, heating it to a certain degree, and then burnishing it. A Rod of Silver thus gilded, drawn into Wire, and flattened, may have 100 Sq. Inches covered completely with 1 gr. of Gold. Copper or iron are gilded in the same manner.</p> <p>Also—By rubbing on the Silver, with a wet Cork, burnt Rags, which had been dipped in a Sol. of Gold in Aq. Reg.—To be rendered visible by burnishing.</p> <p>(d) PARTING BY THE QUART, of Gold from Silver; the quantity of the latter must be at least $\frac{1}{4}$. to enable the Aq. Fortis to act upon it. Gold is discovered by dropping a sol. of the suspected substance in Aq. Reg. into a like sol. of tin well edulcorated; a Ruby colour betrays the gold.</p> <p>NATIVE.....Solid Masses—Granular—Vegetable-form—Druse—Superficial—MINERALIZED—with Sulphur—Iron—Mercury—or Zinc, with Iron or Sulphur.</p>	11.095	<p>AIR-WATER OR HEAT—are incapable of altering it: or dispelling its Phlog. A powerful Lens causes Fumes; which condensed, become pure Gold. HEAT—makes it red-hot long before fusion. In melting, gives it a brilliant bluish-green Colour; for this purpose it requires a stronger deg. of Heat than Copper does. The Gold, in cooling gently, contracts, and shoots into quadrilateral Pyramids. The Calx of Gold, however obtained, is reducible to its Metallic state by heat alone, without additions; as if it attracted Phlog. from the Light. Heat alone will not calcine it. METAL. SUBST.—SILVER, PLATINA, COPPER, IRON or ZINC—do not destroy its ductility. ARSEN. COBALT, NICKEL, BISMUTH, AND REG. OF ANT.—lessen its malleability; and, in certain proportions, cause its calcination. MERC. has a stronger attachment to it than Iron to the Magnet; and (1) is used in separating it from earthy Substances. TIN—even the Vapour of 1 Gr. to 8 Oz. makes Gold brittle. LEAD. LEAD-GLASS or LITHARGE—(3) Melted with it on the Cupel, purifies it, by vitrifying the heterogeneous imperfect Metals; and absorbing them. ACIDS—in their simple State have no effect upon it. VIT.—distilled off Manganese is then only, capable of dissolving it. NIT. corrodes it; and, on shaking, the particles of Gold fall to the bottom. MUR.—in a dephlogisticated State only, can dissolve it: but Aq. REG.—(4) is the most effectual solvent of Gold; exciting effervescence. The Solution is deep-yellow; tinges Anim. subst. deep Purple, and corrodes Them. Yields Crystals; which distilled, produce a (5) Red Liquor, esteemed by Alchemists. The Gold may be precipitated from this sol. by such metallic substances as have a greater affinity with the Aq. Reg. or with either of its Acids, than itself has, as VIT. OF COPPER (8 times its weight) dissolved in Water, or VERDEGRIS in Vinegar: or sol. of MERC. in Aq. Fort. more effectually, having a greater affinity with the Mur. than the Nit. Acid, and also a greater with the former than Gold has. VIT. OF IRON—precipitates it; and, as it has not the like effect on Solutions of other Metals, (6) is employed to purify Gold: and, producing a rich colour, is used by gilders. Sol. of TIN in Aq. Reg.—diluted in 100 P^{ts} Water, upon which the Sol. of Gold is poured, the mixture being stirred, and then left to rest for some Hours becomes Red; a few Drops of the Tin Sol. being added to precipitate the G. a fine (7) Red Powder settles at the bottom in a few Hours; which tinges Glass ruby, and Earths Purple; and is used in enamelling. PHLOG. MATTERS—will also separate the Gold. VIT. ETHER—becomes coloured by it, leaving the Aq. Reg. colourless. Light OILS, AND SP. OF WINE have somewhat similar effects. ALK. FIXED or VOL.—precipitate from this Sol. of Gold in Aq. Reg. a (8) reddish-Yellow Powder; which, in a very small degree of Heat, explodes with a fragor greater than that produced from Gunpowder: probably proceeding from the sudden escape of a quantity of Fixed-Air, furnished by the Alk. If a Bell is previously set over the fulminating Metal, the Gold will be found at its Sides. Boiling the Powder in Water destroys the explosive quality; the Infl. Princ. imbibing the Fixed-Air—It is best reduced by grinding with it twice its weight of Flowers of Sulph., and heating the Mixture sufficiently to burn away the Vapours; then adding a little Borax, previously melted with the fixed Alk. and raising the Fire to bring the Gold into fusion. The Powder may also be reduced by pouring on it a large quantity of fixed Alk. especially Caustic, made fluid; or of Vit. Acid; drying the Mass, and throwing it gradually, mixed with pinguious matter, into a Crucible kept red hot. Or, by mixing with it Sulphur, which however, will not destroy the explosive quality, if the Aur. Fulm. was made of Fossil Alk. ALK. FIXED—or SULPHUR have no effect upon Gold singly. But, united (9) form with Gold a Mass, by fusion in a Crucible, which is soluble in Water, and will pass through the Filter. The Gold may be precipitated by Copper or Iron, or by Vinegar, in a Powder, from which the Sulphur may be expelled by Heat.</p> <p>NITRE—does not act upon Gold; and is therefore applied to its purification, by means of its Vapours, by a particular (10) Process.</p>		<p>GOLD AND SILVER are separable from Earths or Stones—by pouring Vinegar (having its weight of Alum dissolved in it by heat) on the Substance previously pulverized, edulcorated and dried, (roasted if necessary) decanting after 24 Hours, washing the Powder in warm Water till insipid, and putting it into an Iron Mortar with 4 times its weight of Merc.—then triturating with a wooden Pestle till the Powder is black; adding Water and decanting it repeatedly, so long as it becomes muddy by the rubbing. The remainder, dried with a sponge, (being the Amalgama) and put into a Shamoy Leather Bag, all the Merc. may be squeezed out, except $\frac{1}{4}$ retained by the Gold, which is to be separated from it by sublimation over a flow Fire into a glass Receiver half full of Water.</p> <p>Shining Yellow.....GOLD.</p> <p>(a) Standard Gold. (b) Tests of Gold. (c) Gilding Silver. (d) Quartation. (e) Gilding in Or Moulu (see Merc.) in Or Manheim (see Zinc.) (1) Amalgamation. (2) Purified by Antimony. (see Antim.) (3) — by scarification with Lead. (4) dissolved in Aq. Reg. (5) RED LION. (6) purified by Vit. of Iron. (7) RUBY CALX OF G. Calx Cassi. (8) FULMIN. GOLD. (9) dissolved by Hep. Sulph. (10) Purified by Nitre, or Cementation of Gold.</p>	
<p>Ductile to such a degree as that 1 Gr. may be stretched to 5 feet 11.095 8 In. length, and 2 In. breadth. Elastic, more than Tin, Lead, or Gold; less than Iron, Platina, or Copper. Sonorous beyond every metal except Copper. Cohesive, so as that a Wire $\frac{1}{16}$ of an Inch Diam. will sustain 270 lb.</p> <p>(a) STANDARD SILVER of Eng. consists of 11 oz. two P^{wt} fine Silver, and 18 P^{wt} of Copper to the Pound: of this 1 lb. is coined into 62 Shil. Hence when the Mint price of Stand. Silver is 5s. 5d. the Market price of fine Silver is 5s. 7d. per oz.</p> <p>(b) ALLOY is added, partly to harden the Metal, and partly to save the expence of separating the Copper which it usually contains.</p> <p>(c) PLATING OF COPPER—On small Ingots of Cop. bind, with Iron Wire, small Plates of Silver; allowing about 1 of Silver to 12 of Copper. The surface of the Plates being made not quite so large as that of the Ingot, on its edges, which are uncovered, put a little Borax; and expose the whole to a strong heat till the Borax melts, and thereby contributes to melt the Silver to which it is contiguous, and attach it to the Copper. This is brought to a certain thickness in a Mill, and afterwards reduced by hand-rollers; sometimes so as not to exceed the $\frac{1}{1000}$ part of an Inch. Iron is plated the same way.</p> <p>(d) FRENCH PLATE—On brass, heated to a certain degree, apply Silver Leaves one over another, from 10 to 100; rub it with a Burnisher till they adhere.</p> <p>(e) Dials of Clocks are silvered by rubbing Them hard with Luna Cornea.</p> <p>(f) The Sol. of Silver in the Nit. Acid (or of Lunar Crystals) dyes Animal substances, as Silk and Hair, a beautiful Black. Stains also the hardest Substances, as China; and Marble, which may be etched by it. Discovered—by the whitish colour given its Nit. Sol. by the Mur. Acid.</p>	11.095	<p>AIR-WATER OR FIRE—do not alter it. But hepatic or phlogistic Effluvia tarnish it; possibly owing to Copper adhering to the Silver. HEAT—is apt to make it rigid, if hammered to a certain degree: nealing restores its malleability: melting it many (20) times, it produces an Olive coloured vitreous Calx. With GOLD or STEEL in due proportion, it assumes a greenish or bluish colour. Heat of the collected Rays of the Sun carries it off in Smoke, which, condensed by a Plate of Gold, is found to consist of particles of Silver. Melting Silver, suffered to cool slowly, shoots into Octahedral Crystals. METALS—in general (COPPER excepted) take away its elasticity, and (except GOLD AND COPPER) its ductility. LEAD—has a strong attachment to it, and is seldom to be obtained quite free from Silver; but its CALCES will not dissolve or unite with it; (1) which furnishes the means of purifying it from Base Metals. ARSENIC—will not unite with Silver; but flies off from Arf. Silver-Ores in the Fire, leaving the Sulphur, as the Medium uniens, with the Silver. NICKEL—will not unite with it. TIN—unites with Silver; but this being fused with Lead, and some Iron Filings and Alk. cast into the Crucible, the Lead will take up the Silver, and the Tin unite with the Iron. The compound of Sil. and Tin is white, brittle, and soon tarnishes.</p> <p>ACID. VIT.—in the state of boiling, or dephlogisticated over Manganese, dissolves it with effervescence. NIT.—is its most specific Menstruum, and twice its weight dissolves it; attacking it even cold, generating heat and effervescence, and emitting orange-coloured Vapours. The Sol. is at first Blue, probably owing to Copper: if the Acid should be mixed with Vit. or Mur. Acid, a Precipitate of vitriolated Silver, or of Lunar Caustic takes place; and the Sol. becomes colourless. Hence (2) Nit. Acid is purified from these Mixtures, by dropping gradually into it some of this Sol. by which the Mur. or Vit. Acids attaching themselves to the Silver, whose affinity for these is greater than for the Nit. Acid, the latter is left pure. And this is a (3) nice Test by which to detect Com. Salt, or Vit. Acid in Mineral Waters. This Sol. in the Nit. Acid, being evaporated, produces (4) White Crystals, scaly, sometimes Hexag. or Octaed. insoluble in Water: deprived of the Water of crystallization by fusion, they become a (5) black and corrosive Mass. MUR. ACID—attracts the Calx, but cannot dissolve the Metal, except it is dephlogisticated. Its affinity to Silver is however stronger than that of the Nit. Acid is; and, being added to the Sol. of Silver in that Acid, will unite with, and precipitate the Silver; and this is the usual method of obtaining the Sol. of Silver in the Mur. Acid. The Precipitate is insoluble in Water, and the union so great as not to be separated by Fire; which forms it into a (6) vitreous Mass. The (7) Silver obtained from this is of the purest kind. It is effected by melting together 2 parts Luna Cornea with 1 of Fossil Alk. and some Inflam. Matter. Aq. REG.—also dissolves Silver, but a Luna Cornea is immediately formed by the Mur. Acid. VEGIT.—may be made to dissolve Silver, and this Sol. of it is the only one which can be taken internally.</p> <p>ALK. VOL.—precipitates from the Nit. Sol. a Calx which gives a yellow tinge to Glass. PRUSSIAN ALK.—dissolves its Precipitates.</p> <p>METAL.—SALINE AND EARTHY SUBSTANCES—decompose the Sol. in Nit. Acid. MERC.—in form of an Amalgama yields an (8) abortive Precipitate.</p> <p>NITRE—has no effect on it; but (9) purifies it from all Imperfect Metals, which it calcines, by consuming their Phlogiston, being added to the mixed Metals reduced to Filings and projected into a red-hot Crucible.</p>		<p>SILVER is separated from the Ore by mixing it, pulverized, &c. with 8 times its weight of pure lead; which is to be kept in gentle fusion in a Tefl. until the whole is found to be melted, except the Scoriae: then casting it into a cone; and when cold, separating the Regulus. If the stony Matter cannot be washed away the quantity of Lead is increased, and Glass of Lead added: the same is done if the Ore is Pyritaceous, after much roasting. If the Ore does not promote the Fusion, Black Flux is added. And if the Ore contains Iron in its Metallic State, this must first be reduced to Calx by dissolving the Ore in Vit. A. and then evaporating the A. Silver is refined in the Cupel, and if it contains Cop. requires 16 parts Lead to destroy the Copper.</p> <p>Shining White.....SILVER.</p> <p>(a) STANDARD SILVER. (b) Alloy. (c) Plating of Copper. (d) French Plate. (e) Dials silvered. (f) Black Dye for Hair. (1) Silver refined in the Cupel. (2) From Tin. (3) Nit. Acid purified. (4) Com. S. detected in W. (5) Lunar Crystals. (6) Lapis infernalis. (7) Luna Cornea. (8) Purest Silver. (9) Arbor Diana (See Merc.) (10) Purification by Nitre.</p>	

<p>NATIVE mixed with</p> <p>SULPHUR. Richest of Sil. Ores; conts from 72 to 77 pr. Cr. 1.200 Silver.</p> <p>with Copper and Ant.—contains 1 to 12 pr. Cr. Silver—and 12 to 24 Copper. This is the Commonest of all Silver Ores.</p> <p>with Antimony—contains 1 to 5 pr. Cr. Silver—24 Copper...</p> <p>—and Barytes—The product of decayed Ore.</p> <p>with Lead—produces little Silver, (see Lead Galena).</p> <p>—and Ant.—Yields $\frac{1}{2}$ oz. to 2 oz. Silv. 40 or 50 Lead pr. Cr.</p> <p>with Zinc—Yields 24 oz. Cr. Silver—20 pr. Cr. Zinc.</p>	<p>Heat—in a slow degree dispells the Sulphur; leaving the Silver in Filaments.</p>	<p>Lamell^{rs}. Granul^r. Capill^r. Crystallized. Solid { Crystallized. Amorphous. Crystallized { Capillary. Pyramidal. Grained, thin Particles, soft Sparlike Steel-gr^d. Scaly, Cryst^d. Cub. Fibrous, fine or coarse. Radiated</p>	<p>Lead col^r. Grey, Black.....Glass Ore (improperly.) Brown, Yel. Green, Blue. Lead col^r.—Reddish Powder. Grey Copper Ore. Plumose Sil. Ore. Buttermilk Ore. Pyritous Sil. Potter's Ore. Antim^d. Lead Ore.</p>
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with Lead—produces little Silver, (see Lead Galena).....
—and Ant.—Yields 1 oz. to 2 oz. Silv. 40 or 50 Lead pr. Ct.....
with Zinc—Yields 24 oz. pr. Ct. Silver—30 pr. Ct. Zinc.....
and ARSENIC con^t Silver 60—Ars. 27—Sulp. 13 pr. Ct. | 5.400 to 5.684
little ARSENIC con^t Iron—The Solid contains 60—the Looft 25 pr. Ct. Silver.....
ARSENIC.....with Iron—The lamellar contains from 3 to 10 pr. Ct. Silver.
The striated 60—and the Conchoidal about 2.
Heat—by fusion diffuses the Arf. leaving the Silver contaminated with the Iron.....
and SULPHUR with Iron—sometimes contains native Silver.....
—and Copper—Yields from 10 to 30 | 5.000 to 5.300
pr. Ct. Silver.
Heat—and striking fire from it with Steel detects the Arsenical smell.....
—and Cobalt—The dull yields 10, the Shining 40 or 50 pr. Ct. Silver.....
Heat easily melts it.....
PHLOGISTON—In fact a Coal containing Silver, 6 pr. Ct.....
MUR. ACID. Contains 70 pr. Ct. Silver; when free from Iron
COMBINED with NICKEL..... } Contains about 6 pr. Ct. Silver.....
GALENA AND OCHRE.....Contains but 4 oz. Silver pr. Ct.—swims on Water.....
Heat—of the Sun gives it a violaceous brown col.—Fire melts the Earthy Parts without Smoke.
{ Soft—sometimes Crystal..... Cubical..... White, Pearly, changeable. } Horn Silver Ore.
{ Friable..... Black, Brown..... Greenish, with Yel. and Red., Gooseding Sil. Ore.
Mortdore col..... Foliateous Sil. Ore.
Is found in form of small Particles of lamellar texture, which were probably separated from Grains of Gold by amalgamation. | 10.035 to 23.000
The metal is malleable when pure; and so ductile as to be drawn into wire of 1/32 Diam. which will admit of being flattened, and is stronger than that of Gold; but is not capable of being tempered. It is heavier than Gold.
To discover Platina—dissolve the suspected Substance in Aq. Reg. and to the Sol. add that of Sal. Amm. the Precip. (if any) will be Platina.
To distinguish Gold from Platina—To the Sol. of the Subst. in Aq. Reg. add a Sol. of Tin in the same Acid; the Precip. will not be of a Purple Col. if it is Platina.
To separate all Metals from Platina—To their Sol. in Aq. Regis, add a Sol. of Green Vit. which will precipitate all but the Platina.
(a) To purify Platina—To the remaining last Sol. add a Sol. of Sal. Amm. and the Precipitate will be pure Platina.
HEAT—of Fire in no degree melts it *per se*, or with the usual Fluxes. But the Rays of the Sun, concentrated by a Mirror of 22 In. Diam. has produced smoke, ebullition, corrosion, and a Metal of the appearance of Silver; equally ductile with Silver and Gold, and emulating their fixity; emitting no more fumes when brought into fusion, nor affected by Lead or Nitre. GOLD is rendered hard and pale by it. COPPER OR BRASS more hard, tough and bright. IRON hard and tough. ARSENIC AND COBALT—melt with it freely.
ACID VIT.—dissolved in Manganese—would probably dissolve it, as does the MUR. in the like circumstance. Aq. REG. is the most powerful Solvend. The Solut. is first yellow; further loaded Red: which produces deep red Crystals, of difficult Solution; generally opaque, sometimes transp. but this, added to a Solut. of Tin in the same Acid, does not give it a Purple Col. as Gold does. MUR.—by trituration, qualifies it to amalgamate with Merc.
ALK. VEG.—in small quantity, precipitates from the Sol. in Aq. Reg. octaed Crystals, soluble in Water. In larger quantity, a yellow spongy Powder, soluble in all the known Acids, but not in Water. MIN. spontaneously calcined, added in large quantity, precipitates also a Calx: and also precipitates Gold mixed in the Solution. VOL. precipitates it, but the Precip. does not fulminate, as the like Precip. of Gold does. SAL. AMM. precipitates it from the Sol. in Aq. Regis; thereby distinguishing it from all other Metals; and may separate it from them. PRUS. ALK. or GREEN VIT.—do not precipitate it, as they do all other Metals; but Iron or Gold, which have remained in it's Sol. in Aq. Reg. may be separated first by these; and then the Platina may be separated pure by the Sol. of Sal. Amm. LIME-WATER will precipitate it also.
INFLAM. SUBST.—ETHER—separates Gold from Platina, by sucking up the Gold; but AROM. OILS—suck up the Platina.
NITRE—will not deflagrate with, or calcine pure Platina; as it does all Metals except those that are perfect.
PLATINA made fusible, by dissolving it in 20 Aq. Reg. adding next day to the Sol. decanted, an equal quantity of distilled Water, precipitating with Sal. Amm. and filtering. The Red-dium kept 4 an hour in a Red heat exhibits a filamentous Mass, which pressed down, and continued 12 Minutes is found malleable; but magnetic; which property it loses by farther fusion.
(a) Purification by Plat.
It's natural state is that of Solidity, but it becomes fluid in any | 13.500 to 13.600
degree of Heat greater than 40° below 0.
It's Expansion and Contraction are in proportion to the greater or lesser degree of heat in the Atmosphere; on which quality Barometers are founded.
It's Volatility furnishes the means of separating it from Ores and Metals, and obtaining it pure in a Heat of 600° by Sublimation.
It's great attraction for Gold and Silver gives an opportunity of separating those Metals from Sand or Ores by amalgamation.
(a) GILDING IN OR-MOULU—Rub Merc. on a thin piece of Gold till it becomes Paste; of which spread a part on the Surface of the Copper [or of Iron, first coated with Copper, by immersing it into a Sol. of Blue Vitriol] intended to be gilded; and expose the Metal to a proper degree of heat to discharge the Merc. It is to be finished by burnishing, &c.
(b) SILVERING OF GLASS—On Tin-foil, fifty disposed over a sloping Table, pour Quicksilver; and gently spread it with a Hare's Foot until they unite. On the Tin leaf cautiously slide the Plate of Glass, so as to sweep off the superfluous Merc. Lay weights on the Glass for a little time, and the Tin will be strongly cemented to the Glass. 2 oz. Merc. will silver 3 sq. feet of Glass.
(c) ARBOR DIANE—Pour 5 parts distilled Water on 4 Silver dissolved in Nit. Acid, added to 2 Merc. in a Phial already containing 6 Amalg. of Sil. In a few Hours the Metals attract each other, exhibiting tetrahed. Crystals, which unite in a vegetable form.
(d) LUTE FOR GLASS VESSELS—2 oz. melting lead poured upon 1 lb. Merc.
(e) Merc. for Barometers should be as fat and full of Phlog. as possible. This is effected by adding to the Merc. intended to be purified Iron Filings; which, during the Sublimation, will furnish a quantity of Phlog.
(f) Merc. is best divided by viscid Fats or Balsams, by trituration: the quantity of powder obtained with water is small; it soon returns to its former state. Mercury is discovered by throwing the suspected Substance, powdered, on a heated Iron Plate, or Brick; and covering it with a Glass Vessel, to catch on its Sides the sublimed Particles.
AIR—WATER—OR FIRE are incapable of destroying it. But the heat of the Atmosphere is sometimes sufficient to sublime it.
HEAT—equal to that of boiling Water, continued for some Years will convert a portion of the Merc. into a (1) dark Grey Powder. With the same degree, in a flat-bottomed Matrafs, with a Neck drawn out into a capillary Tube, a Calx is produced, in form of a (2) Red Powder, in 20 Hours. The same effect attends its trituration. But these Calces are all reducible by Heat alone. COLD—40 Deg. below 0, concretes it; and it is then almost as malleable as Lead.
ACID VIT.—concentrated and boiling hot, and urged by Heat, reduces it to a kind of (3) White Powder; which, by affusion in hot Water, becomes Yellow; in cold Water the colour is not altered. This Sol. has the smell of Vol. Sp. of Sulphur.
NIT.—dissolves it rapidly, but the Vit. will seize the Metal from the Solution. The (4) Sol. made without heat is greenish at first, but soon becomes limpid: is used as a (5) Test in the Analysis of Min. Waters. Little Phlog. having been lost, the Salt easily crystallizes, is then white, and scarcely acrid. But if made over a Sand Heat the action of the Solvent becomes stronger, as 10 oz. Nit. Acid will take up 8 of Merc. On cooling (6) Crystals are formed, for the most part like Needles; very caustic, and which redden the Skin. These detonate on burning Coals; heated in a Crucible exhale reddish Fumes, and assume a deep Yellow Colour, which changes to Orange, and then to (7) brilliant Red. These are very caustic, and stain the Skin black-purple.
NITROUS SOLUTIONS OF QUICK-SILVER. Made without Heat. Made over a Sand Heat.
Distilled Water..... causes no precipitation..... White Precip. which, boiling Water added, turns Yellow
Alk. Veg.—Caustic..... produces a precipitate..... Yellow
—Mild..... White
Mineral..... Yellow, but turns White
Volatile..... Grey-black
Acid Vit.—(Glauber Salt)..... granulated..... White
Mur. (Com. Salt)—curdled, and in large quantity..... White
Mucilaginous Matter..... White
MUR.—rarified by Heat, and it's Vapours meeting those of Merc. a Sublimate arises, and is condensed into (8) Crystals; pointed like Daggers: the strongest of all Poisons. More Merc. being added to the Acid (not yet saturated, whence its corrosive quality) and again sublimed two or three times, the sublimate becomes (9) Sweet, and not poisonous. The Sublimation repeated 9 Times, digested 8 Days with Aromatic Sp. of Wine, and dried after decantation, becomes (10) very gentle.
ALK. FIXED—will unite with its Calx: if mixed with twice its quantity of dried Blood will stain Iron Blue (*). This precipitates a Brown Powder from Sol. of Cor. Sublim. whereas VOL.—(as Sal. Amm.) diluted, produces White. A Test to distinguish the Alk.
LIME-WATER—will precip. the Merc. from it's Sol. in a Yellow Powder, which is re-dissolved by adding more L. Water; and gives a (11) Yellow Solution.
SULPHUR—in fusion, or by trituration combined with Merc. in equal parts, produces a (12) Black Powder. If there were 6 parts Merc. and the Fire was strong, (13) Crystals of a brown-red-yellow are found sublimed. ALK.—LIME—OR IRON will precipitate the Mercury from these.
METALS and S. METALS—are attracted by, or amalg. with it in the following order; viz. GOLD, SILVER, LEAD, TIN, ZINC, COPPER, IRON barely, BISMUTH and REG. of ANT. only when mixed with other Metals, PLATINA and COBALT not at all. Bismuth disposes some Metals to so intimate an union with Merc. as to pass with it through the Pores of Leather. The Amalgama of Gold crystallizes into 4 ang. Pyram. 1 oz. retaining 6 oz. of Merc.—of Silver dendrit. cryst. retaining 8 oz.—Lead the same Form, retaining 1 1/2 oz.—Tin, Shining Lamella, retaining 3 oz.—Bism. 8 edral Crystals with black Surfaces, retaining 4 oz. and Zinc, 8 gonol, retaining 2 1/2. CALCES OF MET. will not be touched by Merc.
MERCURY is separated from the Ore (Cinnabar) by distilling the pulverized Ore, mixed with equal Parts of clean Iron filings (fixed Alk. Calc. Earth, Copper, Lead, Silver, or Reg. of Ant. might be used, each having a stronger affinity with Sulp. than Merc. has) on a Sand Bath, in which the Body of the Retort is buried, the Noile of the Neck entering 4 an In. into Water in the Receiver. The Merc. rising with a well-regulated Heat, falls in drops into the Water by which it is condensed, in the proportion of 1 if the Cinnabar is good; whilst the Sulp. attaches itself to the Iron.
Note—Green Glass Retorts are the fittest, the White containing Lead which is subjected to melt, even before the Glass.
Indurated—Striated—Granular Argill. and Cryst..... From Yellow to deep Red..... Native Cinnabar.
Friable..... Red-Ocre like..... Nat. Vermillion, or Flowers of Cinnabar.
Pyritous Cin. Ore.
Friable..... Grey, Whitish.
Friable, Glassy..... Black, Grey.
Solid..... Red-brown, Red fracture.
Sparlike..... White & bright, or Yel. & Bl.
Liver and Burning Ores.
Butterkilk Ore.
Pyritous Sil. Potter's Ore.
Antim⁴. Lead Ore.
Blende, Mock lead.
Grey Ars⁴. Silver Ore.
Red Ars⁴. Sil. Ore.
Mulg.
Whitish..... Silver Pyrites.
Yellowish-white.
Whitish, some Brown..... White Silver-Ore.
Whitish, Lead colour..... Weissgulden Ore.
Blackish, Grey—Rosy Part..... Goose-dung Silv. Ore.
Black..... Combustible Silv. Ore.
White, Pearly, changeable. } Horn Silver Ore.
Black, Brown..... Greenish, with Yel. and Red., Gooseding Sil. Ore.
Mortdore col..... Foliateous Sil. Ore.
WHITE..... PLATINA.
WHITE GOLD.
QUICKSILVER.
(1) Ethiops per se.
(2) Precipitate per se.
(3) Turbith Mineral.
(4) Mercurial Water.
(5) Test of Min. Water.
(6) Mercurial Nitre.
(7) Red Precipitate.
(8) Corrosive Sublimate.
(9) Merc. Dulcis.
(10) Panacea of Merc.
(11) Phagedonica.
(12) Ethiops Mineral.
(13) Falsitious Cinnabar.
(a) Gild. in Or-Moulu.
(b) Silv. Looking Glass.
(c) Arbor Diana.
(d) Lute for Glass.
(e) Merc. for Barom.
(f) Merc. Ointments.
(*) Iron stained Blue.

Yellowish-white.

When A. is made by Mild Iron, till all is consumed.

TIN.

- (1) *Grained Tin. Tin Tears.*
- (2) *Granulated Tin.*
- (3) *Flowers of Tin.*
- (4) *Hence called Diabolus Metalorum.*
- (5) *Sily. purified from Tin*

(6) *White Enamel.*
(7) *Aurum Muscorum.*
(8) *Nitre of Tin.*
(9) *Butter of Tin.*
(10) *Smoking Sp. of Lib*

(11) *Crystals of Tin.*
(12) *Acid of Tin.*

(13) *Scarus exaltus*.
(14) Powder of Cassia.

(a) *Tin Foil made.*
(b) *Copper Tinned.*
(c) *Iron Tinned.*
(d) *Pins whitened*

(c) *Pewter.*
(f) *The quantity of Lead in Tin detected.*
(g) *Aurum Myfrum.*
(h) *Putty.*
(i) *Solder for Lead.*

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Figure 1

Black-brown like Garnet..... Tin Stone.
White-grey. Yellowish..... Tin Spar. White Ore
Brown. Black. .. Tin grains.

Zinc Colour.
Shining Yellow.....Nat. Aurum Musivum.

Bluish-White. LEAD.
(1) *Granulated Lead.*
(2) *Litharge of Gold.*

(3) Silver.
(4) *Gold and Silver refined by Lead.*
(5) *Glass of Lead.*
(6) (c) *Musfic.*
(7) (c) *Musfic.*

(7) (1) *Wittium*, Red L.
(8) *A Cadmia Fornacum*.
(9) *Lead Crystals*.

(9) *Lead Crystals.*
(10) *Lead separated from Copper.*
(11) *Syn-pathetic Ink* (see *Inflam. Sub.*)
(12) *Patent Yellow* (see *Alk. from Cam. S.*)

- (13) *Plumbum Corneum.*
- (14) *Composition for Com. Crucibles.*
- (15) *Achromatic Telescopes.*
- (16) *Virginal of Lead.*

(16) *Plumbum Lead.*
(17) *Nitrum Saturni.*
(18) *Plumbum Corneum.*
(19) *Ceruse. White Lead.*
(20) *Sugar of Lead.*
(21) *Succrose of Vinegar*

(22) (k) *Basis of Playfers.*

(a) *Sheet Lead.*
(b) *Leaf Lead.*

the Ore a r
the Ore, an
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ANALYSE
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White.....Ochre. Native-Ceruse.

White, black, L. Spar, Sparose Ore.
White, green, black, Red, &c. Native Minium.

PURE.

NATIVE.

PURE.

MINERALIZED BY
CALCIFORM
SILIC.
ARGILL.
UN-
KNOWN.

SULPHUR.

ARSENIC.
VIT.ACID.
PHLOG.
METALS.

The most diffused and abundant of all Metal. Subst. being found combined with all Fossils, and with Anim. and Veg. Productions. Of distinguishable small, and peculiar stypic Taste, which it communicates to Water in which it is quenched.

Ductile and malleable to a considerable degree; and so tenacious, that a Wire $\frac{1}{16}$ of an In. diam. will sustain 450lb.

Strikes fire with Flint and hard Stones, emitting decrepitating ignited Particles, $\frac{1}{100}$ part of an In. diameter, grey, hollow and brittle.

Attracts the Magnet, and is capable of (a) receiving the attractive power by contact with it, or by long remaining, or being drawn out in a position pointing nearly to the North and South.

Elastic and hard, when purified and tempered, in a deg. greater than any other Metal.

(b) IRON—CAST—30 hd. made into Wire is reduced to 20 26.....Bars.....25

BAR—30 yields of Ware at an average.....20

(c) STEEL—CAST—loses 2 parts when made into the shape of Razors, BAR.....4.....} Files, Springs, &c.

Is capable, by manufacture, of becoming 630 times more valuable than Gold; and of receiving a polish so high, as to give it a white and brilliant appearance.

(d) Is made by Cementation of the best forged Iron; the Bars being set upright in a Crucible, stuffed and covered with the Cement, and a Tile luted over it, and kept in a moderate fire 8 or 10 Hours.—A good Cement is of 1 part Wood-ashes, and 2 of Animal Charcoal, burnt in a clove Vessel.

(e) Purified by a perfect fusion, and cast into Bars.

(f) Tempered—by plunging it red hot into cold Water repeatedly, until the colour is exhibited on the Metal, which denotes the hardness required. These Colours succeed each other in the following Order, viz. Yellow-white, Yellow, Gold, Purple, Violet, deep Blue, Whitish-yellow; after which, ignition takes place.

(g) Stained blue by moderate calcination. Or by Merc. (which see) and dried Blood.

(h) Iron preserved from rust, by smearing it with a Mixture of Linseed Oil evaporated to thickness, and Varnish.

(i) Cast Iron—is pulverized by bringing it to a white heat, and pounding.

(k) Iron filings and Sulp. made into Paste with Water, grows hot, and bursts. If in quantity, it takes fire when the Vapours cease.

Detected by the Magnet, the Ore being pulverized, and kept hot some time. Antimony, however, will prevent the attraction. Or by the blue or black colour given to Infusion of Galls by its Sol. in Vit. Acid, or to Prof. Alk. dissolved by what means soever.

Of doubtful existence, what passes for such being probably of Volcanic production. Is of the Red-short kind.....

The Calciform are the most numerous of all the Iron Ores; and seem, by their heterogeneous Mixture, to be formed by precipitation and deposition, from Waters; and result from the decomposition of Iron Ores, made by Water, and the Aerial Acid, which attracts the Phlog. contained in the true metallic Ore. Their Basis is either the black, or blackish-brown Calx of Iron, somewhat dephlog. and magnetic; or the red Calx, which is more dephlogisticated, and not magnetic, till roasted. Hematites, or Blood-stone, are so called, because all the kinds reduced to powder, produce a red colour, except the Yellow. They seem to be the result of the primitive Iron Ores, and to have been formed like the stony concretions, and the stalactites. They are generally hard; and some strike fire with steel, and usually contain a little Argill. and some Mang.—Are not magnetic before torrefaction, but become black and magnetic by fire. Some of the crystallized kinds possess a variety of beautiful Colours.

They yield from 40 to 80 pr. Ct. of good Metal. In some places they form whole Mountains.

The hardest (particularly the dark-blue kind, resembling black-lead) are used for (1) burnishing Gold-leaves and Metals.

100 parts cont. Calx of Iron 38—of Magn. 24—Earth 38. Does not strike fire with steel.

As Garnet, Jasper, Trap, and some siliceous Sands rich in Metal.....

Mountainous—consists of Iron Calx, with Argill. and Magn.

Swampy—the Iron produced from it is of the Cold short kind.

With Alk. and Phlog.—consists of Clay mixed with Iron, and some unknown tinging Substance, generally found in swampy ground.

Terras is more hard and porous than Pozzolana, which resembles Clay baked, and reduced to Powder, and is more magnetic.

When pulverized, either is used as a Cement.

Much—perfectly saturated: from this Copperas and Sulp. are extracted.

Little—Magnetic—attracts and is attracted by Iron powerfully.

Refractory—Emery seems to be a mixture of white and red Calces of Iron and Tripoli. Scarcely yields in hardness to any substance except the Diamond.

Never used as an Iron Ore, but to polish Metals: the dark grey best.

And EARTHS—Silic. Argill. or Calc. yield from $\frac{1}{2}$ to $\frac{1}{4}$ Sulp. 4.912 to 7.300 and from $\frac{1}{2}$ to $\frac{1}{4}$ Iron.

And ARSENIC—strikes fire with steel, but is not magnetic.

Not magnetic, unless it cont. $\frac{1}{10}$ Arf.—Yields 30 or 40 pr. Ct. Arsenic.

Contains much Iron, and little Sulp. scarce strikes fire with Steel: is magnetic.

Fixed—yields 30 pr. Ct. Iron.—Vol. cont. Plombago and Coal.

Sulphurated and arsenicated—Zinc, Tungstein, Mangan.

AIR, WATER, OR VAPOUR—calcines (rusts) its surface, in a longer or shorter time, proportioned to its hardness and polish.

HEAT—before ignition, produces on its polished surface, prismatic colours, increasing its malleability, but expanding it less than it does any other hard Metal; whence its use in the Compound Pendulum: makes it red hot sooner than it does any other metal, producing a black scaly calx, which becomes deep red, when pounded; and melted with Glass, in large quantity, makes it black-brown; but in a small quantity, greenish, which may be expelled by heat.—WHITE HEAT gives the Iron a vitreous coat, which flies off in scales, brightening the Flame, and making it white: in this state, two pieces applied together, adhere, and may be perfectly united by (2) forging (peculiar to this Metal and Platina).—A greater heat is required to melt Iron, than any other Metal, except Platina and Manganese: in the act of fusion, it shrinks (contrary to other Metals) and is more dense; but returning to a consistent state, it expands, and assumes a convex form; this quality gives it an excellence in receiving impressions, when cast in moulds. (3) Hard and brittle in its first state; repeated fusion with Charcoal, and strong compression before it cools, makes it (4) soft and tough; and this cemented with Charcoal in a strong fire, becomes of an (5) intermediate quality, generally (6) blistered, somewhat heavier, though lessened in dimensions, and capable of becoming (7) extremely hard by repeated ignition, and quenching in cold Water, assuming as it cools, a succession of Colours. STEEL, cemented with Calc. Earth, is reduced to forged Iron: by fusion it becomes (8) most pure and brittle when heated. NITRE detonates, and SAL. AMMON. is decomposed in distillation with it. SULP. combines with it; and (9) rubbed on a red hot bar, melts it into a Mass resembling Pyrites in appearance and texture.

ACIDS—VIT. concentrated, scarcely acts upon it: boiled together in a Retort to dryness Sulp. Flowers sublime: diluted with 2 or 3 parts of Water, it dissolves without applying heat; and Inflamm. Air escapes. If heat is applied, more Iron is dissolved, and (10) whitish green Crystals formed. NIT. concentrated, acts powerfully on Iron filings, discharging much Nit. Air, and depositing a reddish-brown Calx, after some time. Diluted, affords a more permanent Solution, Greenish or Yellow. Neither of these Sol. afford Crystals, but a gelatinous Calx, by boiling: this distilled, affords fuming Nit. Acid, Nit. and phlogisticated Air, and leaves a red Calx. MUR. diluted, dissolves it eagerly, disengaging Infl. Air, and growing hot; the Sol. is yellow-green, and more permanent than the others: it acquires the consistence of Syrup, in which needle-formed, deliquescent Crystals appear. AER. dissolved in Water; combines with a portion of the Iron. ARSENIC precipitates it from the ACET. which scarcely dissolves it without the assistance of Air. PHOS. is found united with it in Bog Ore, making it (11) brittle when cold. GALLIC unites with its Calx, giving a (12) black dye, which is discharged by the Min. Acids. PRUSSIAN precipitates Iron from its solutions, partly in form of a Calx, and partly of a (13) Blue Power, which is purified by dissolving the Calx with Mur. Acid.

ALK.—LIME—and NEUT. LIQUORS corrode it. FIXED CAUSTIC precipitates it from the Vit. solution, in green Flocks, which, dissolved by more Alk. give a red Tincture: MILD—a green-white Precip. which it cannot redissolve. VEG. CAUSTIC produces from the Nit. Sol. a brown Precip. of which a small quantity may be redissolved: MILD—separates a Yellow Calx, which becomes Orange-red. By agitation, during effervescence, the Precip. is dissolved (by the Medium of fixed Air) and the (14) Sol. is a fine red. VOL. PURE—separates a black-green Precip. MILD—redissolves the Iron, giving a more lively red than the former. ALK. and LIME produce a Precip. from the MUR. SOL. which is easier reduced to the Metallic state, than those afforded by the other Acids.

EARTHS—combining only with its Calx, assist the fusion, and impart a green colour to the Glass.

METAL. SUBS.—GOLD, SILVER, and PLATINA unite with it; plunged white-hot into MERC. it becomes coated, but will not amalgamate with it: the (15) CALX STAINS it blue. TIN and COPPER readily unite with it. LEAD not at all, the Iron floating upon it in fusion. BISM. not in the direct way. NICKEL has not been made to unite with it, on account of the extreme infusibility of both; nor ZINC, on Account of its volatility, except in a deg. of heat insufficient to make it rise. ARSENIC forms with it a white, brittle substance, forsaking other Metals, and is supposed to cause the (16) brittleness of some specimens, when hot, which are tough when cold. COBALT forms a Mass with it, not easily broken: ANTIM. a hard semi-malleable combination; and the Crude is (17) purified by it from Sulp. MAGN. is almost always united with it. WOLFRAM forms with white crude Iron, a brittle white-brown Alloy of compact Texture.

HEAT—makes it decrepitate, grow black, and attract the Magnet.

ACIDS—feebly excite effervescence, when it is pounded and heated.

ACIDS—do not excite effervescence unless it is mixed with Calx.

HEAT—renders both of these magnetic.

HEAT—turns it greenish, with a slight flame; then red and magnetic.

ACIDS and ALK.—alternately dissolve, and precipitate it green; but the colour is restored by steeping it in vegetable Astringent.

HEAT—melts these, per se.

ACIDS—excite effervescence; but on the Puzzol. in a small deg. only.

HEAT—gives it a degree of malleability, and make it magnetic.

HEAT—scarcely melts it. NITRE slightly detonates with it.

ACIDS—VIT. dissolve it slowly. NIT. with effervescence.

HEAT—produces bluish flame, and by distillation, Orpiment.

ACIDS—MUR. and then NIT. added, the Sulp. and the Arf. are dissolved; but the Arf. is precipitated by Water, leaving the Iron and a Luna Corn. if it has Silver.

ACIDS—dissolve it, and sometimes separate from it Copper and Silver.

Heat—produces from the Fixed, a languid flame, with a loss of $\frac{1}{2}$.

(See these under their respective Heads)

Friable.	Powdery.....	Yellow, red.....	Native.
	Concrete—Globular, flat, granular.....	Black or light brown.....	Iron Och.
	Solid.....	Dim.....	Bog Ore.
	Cubical.....	Shining.....	Mart. Ochre.
	Fibrous.....		
Indurated.	Scaly, testaceous.....		Iron colour.
	Cryst. 8-edral, polyed. cellular.....		Black, bluish grey.....
	Solid.....	Glaffy.....	Iron Glimmer.
	Radiated.....		Black-brown.....
	Cryst. conic. or concentric Balls.....		Kidney Ore.
	Solid, Scaly.....		Blood red.....
	Cryst. conic. Balls, flat Surf.....		Red Kidney Ore.
	Solid, Fibrous.....		Yellow—yellow powder.....
			Yel. blood-stone.
Indur.	Scaly, granular, } Amorp. or } Transp. } White; grows grey, brown, } Red sparthose Ore.		
	stalactitical. } Rhomb. } something. } red, yellow, black.....		Mart. Jasper, Garnet, &c.
Friable.	Powdery, granular.....	Yellow, red, brown, grey.....	Bole.
Friable.	Balls, grains, or triang. Prisms.....	Brown, blackish.....	
Friable.	Powdery.....	Blue, deep, or light.....	Native Prof. blue.
Loose.	Spongy.....	Whitish-yellow.....	Terras.
Indur.	Granular, or dusty and porous.....	Reddish-brown, grey.....	Puzzol. Earth.
		Whitish-yellow.....	Collogne Clay.
Indur.	Solid, or 8-edral Cryst.....	Metallic. Dark, steel-colour.....	Marcasite.
Indur.	Coarse, or fine grained.....	Dull. Brown—Powder black.....	Iron Stone—Magnet.
Friable.	Grained, } Fine.....	Grey, dark, }.....	Emery, proper.
	Coarse.....	Blue, black, } Powder	
	Cubical, scaly, coarse.....	Yel. green. } red.	
Indur.	Lamel. radiated, globular.....	Yellow-grey.....	Pyrites, pale, or deep Yellow.
Indur.	Solid Masses, or.....	White-grey.....	White-grey Pyrites, or Marcasite.
Indur.	Gran. prism. rhomb.....	Bright white.....	Mispickel, Speis.
Indur.	Crytal. Cubic, polyhed. rhomb.....	Brown, reddish-brown.....	Martial Vitriol.
			Hepatic Iron Ore.
			(x) Calamine.

Blue, more or less dark.

IRON ORE ANALYZED—by boiling its Powder repeatedly in Mur. Acid (adding Nit. in Sulp. Ores).

The Iron is precipitated by Prof. Alk. in form of Prof. Blue, which, washed and dried, is equal to 6 times the quantity of Iron it contains; but $\frac{1}{10}$ must be deducted for Iron in the Alk. If united to Zinc or Mang. the Prof. blue, dissolved by Nit. Acid, will take up the Calx of Zinc; and, by adding Sugar, the Mang. The remainder dissolved by Mur. Acid, and precipitated by Mild Min. Alk. leaves the Iron.

Assayed by melting 60 gr. over a strong Fire, with 3 parts of Flux (of 8 Glass, 1 calc. Bor. and 1 Charc.).

SMELTED—The Ore calcined and broken (sometimes Lime added) is gradually cast into a Con. Furnace, 16 to 30 feet deep, upon ignited Charcoal or Coal, and the heat excited with large Bellows. The Metal produced, is White, of brilliant Text. and cryt. Fract. and the most brittle: Grey, with a granulated dull Text: less brittle: somewhat malleable or Black, of rougher Fract. and less coherent than the Grey.

IRON REFINED—by melting it amongst Charcoal, and stirring it till of the consistence of Paste. The parts that partake of crude Iron, and remain in fusion, are expelled by the Hammer or Rollers.

- IRON.
- (1) White Fire.
 - (2) Welding.
 - (3) Cast, or Pig Iron.
 - (4) Tough, malleable Iron.
 - (5) STEEL.
 - (6) Blistered Steel.
 - (7) Tempered Steel.
 - (8) Cast Steel.
 - (9) Artificial Pyrites.
 - (10) Vitriol of Iron.
 - (11) COLD SHORT IRON.
 - (12) Writing Ink and Black Dyes.
 - (13) Prussian Blue.
 - (14) Stahl's Mart. Alk. Tincture.
 - (15) Iron stained blue.
 - (16) RED SHORT IRON.
 - (17) Purified from Antimony.
- (a) Artificial Magnet.
- (b) Cast Iron.
- (c) Cast STEEL.
- (d) Steel made.
- (e) — purified.
- (f) — tempered.
- (g) — stained blue.
- (h) Iron preserved from Rust.
- (i) Cast Iron pulverized.
- (k) Artificial Earth-quake.
- (l) Burnisher.

HEMATITES, OR BLOODSTONE.

CEMENT.

EMERY.

MINERALOGICAL TABLES.

Expansion of a Foot of the following Metallic Substances by the Temperature of 180°, viz. from the freezing to the boiling Point of Water. Expressed in 10,000 Parts of an Inch.

White Glass Barometer Tube	100	Spelter Solder, viz. Brass 2 parts, Zinc 1,	247
Mart. Reg. of Antimony	130	Pewter fine	274
Blistered Steel	138	Grain Tin	298
Hard Steel	147	Soft Solder, viz. Lead 2 pts.	301
Iron	151	Tin 1,	301
Bismuth	167	Zinc 8, Tin 1, a little ham-	323
Hammered Copper	204	merced,	344
Copper 3 parts, Tin 1,	218	Lead	353
Cast Brass	225	Zinc, or Spelter,	373
Brass 16 parts, Tin 1	229	Zinc, hammered an inch per	
Brass Wire	232	foot,	
Speculum Metal	232		

Expansion of Aerated Substances by Heat. From the freezing to the boiling Point of Water, for every Interval of 45°.

	Air.	32 to 77	77 to 122	122 to 167	167 to 212	Total.
Atmosph.	11 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2
Vital	11 1/2	1 1/2	1 1/2	3 1/2	4 1/2	11 1/2
Phlogist.	11 1/2	1 1/2	1 1/2	5 1/2	5 1/2	14 1/2
Inflam.	11 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2
Nitrous	11 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2
Fixed	11 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2
Alkaline	11 1/2	1 1/2	1 1/2	3 1/2	5 1/2	11 1/2
Vitriolic	11 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2

* Thus marked are uncertain.

and Sp. Gr.

Proportion of Ingredients in Neutral Salts.

	Acid.	Alk.	Earth.	War.	Mer.
Tartar vitriolated	31	63	6		
Glauber Salt	14	22	64		
Vitriolat. Ammon.	42	40	18		
Epsom Salt	24		19	57	
Alum	24		18	58	
Vitriol of Iron	20			55	25
Copper	30			43	27
Zinc	22			58	20
Nitre	30	63		7	
Cubie	29	50		21	
Nitrous Ammon.	46	40		14	
Selenite	33		32	35	
Epsom	36		27	37	
Sal Sylvii	30	63		7	
Common Salt	33	50		17	
Sal Ammon.	52	40		8	
Mur. Selenite	42		38	20	
Borax pure	34	17		47	

Numerical Expression of Attraction s.

	Acids.	Vit.	Nit.	Mur.	Acet.	Aer.
Pond. Earth	65	62	36	29	14	
Veget. Alk.	62	58	32	26	9	
Min. Alk.	58	50	28	25	8	
Lime	54	44	20	19	12	
Volat. Alk.	46	38	14	20	4	
Magnesia	50	40	16	17	6	
Argill. Earth	40	36	10	15	2	

Weight of Mixtures of Tin with Lead in a Cubic Foot.

	Oz.	Avoir.
LEAD...Pure	11270	
TIN Pure	7170	
132 Parts	7320	
16	7438	
10	7492	
8	7500	
5	7645	
3	7940	
2	8160	
1	8817	

The Sp. Gr. is found by subtracting 1000 oz. from the Weight.

ERRATA.

HEADS.	COLUMN OF	ALTERATIONS AND ERRORS.
EARTH. Calc. Pure.	Texture.	Sealed, read Scaled.
Comb. with Vir. A.	Denomination.	Glacies, read Glacies.
Argill. Metal.		(c) read (d)
Pond. comb. with Vit. A.	Constitution.	(d) read (e)
	Affin. with Metals.	After Iron, add but does not contain Metal. Seems to be Perunfe.
		Which Gypsums can yield only, read as Gypsums do, which cannot yield it.
Silic. Quartz, pure Flint.	Constitution.	Between precipitating and the, interpose the words from it.
Argill. Zeolite.	Denomination.	Jude, read Jade.
Stones, Compound.	Constitution.	Oval, read Opal.
Vit.	Denomination.	Ant. read Ancient.
	Constitution.	Before Sal. Subst. insert (6)
	Affinities, with Heat.	Before freeze, insert (2)
	Products.	Under Spirit of Vitriol, insert (2) Glacial Oil of Vitriol, and erase Glacial a little lower down.
		White Vitriol should stand opposite to Zinc, in the Column of Affinities, Green opposite to Iron, and Blue to Copper.
Sperry.	Glass etched.	Aer. Acid, read Fluor Acid.
Min. Stained Glass.	Affinities.	Classii, in three places, read Caffii.
N.SALT. Veg. Alk. with Nit. Acid.	With Infl. Mat.	Insert (2) before white Flame, and alter the subsequent Figures.
	With Earths.	Alk. are decomposed by it, read Alk. decompose it.
	Results.	Under (1) insert (2) Gunpowder or Pulvis fulminans, and alter the subsequent figures
E. Argil.	Title.	ACID of, is omitted after the Words combined with.
Silver, pure.	Affinity, with Heat.	Under (1) insert (2) and alter the subsequent Figures.
Platina.	Contents.	Purification by, read purification of.
Merc.	Qualities.	Barometer, read Thermometer.
Lead, min. by Sulph.		Silver, to 1. 5, read Silver, 1 to 5.
S. MET. Arsenic, pure.	Affin. with Nitre.	Before the Words all of which, insert (9)

NOTICE.

The Figures in the last Column, refer to the Column of Affinities, and the Letters to the Column of Constitution, or Combination, to which the Processes, in the Subject of Metallic Substances, printed transversely, are an Appendix.
The last Column sufficiently supplies the place of an Index; and in this the English, or common Names of the Substances, are adopted, as most generally known.
The Temperature of Substances are estimated by Fahrenheit's Thermometer.
Heat of Water is understood to be temperate at the Deg. of 60.

THE DIFFICULTY of conceiving and distinctly arranging in the mind, during the course of a specific Study, the Series of a complicated dissection of a Subject comprehending a variety of Parts, the degree of connection between each of which, and every other, up to the Genus, or Stock, it is necessary to distinguish; and the quantity of TIME LOST from the actual Study, in adjusting a classification which must appear perplexed to any person who is not a proficient in it, even in the most perspicuous Treatise in the ordinary form of a Book, interperfed with scientific Matter also, have induced ingenious Men, desirous to inculcate the knowledge of particular Subjects, to delineate their Arrangements in TABLES; which, disposed in form of Maps or Charts, produce, at one View, a comprehensible and general Idea of them, or bound up like Atlases, contribute much to disembarass the Mind, and facilitate the Study.

IN the SCIENCE of MINERALOGY [a Science yielding to few in capaciousness and intricacy, to none in utility, and the gratification of the inquisitive Mind] some Books of Tables have been published, of such undisputed merit and use, that it would be presumptuous to offer to the Public a Composition merely on the same plan: This SYNOPSIS is not only compiled on a much more extensive Scale, but also from its peculiar form (which qualifies the whole to appear in one large, or in two moderate sized Sheets, or bound together like Maps in an Atlas, according to the fancy or convenience of the Possessor) renders the Science much less perplexing, at the same time that it communicates a much more perfect knowledge of it.

THE changes which most Bodies are subject to undergo on the application of Heat of Fire, either simply, or when they are in combination with heterogeneous Bodies; or on their Mixture with others, unassisted with such heat, are copiously and methodically stated in the Column of Affinities; and their Products, whether useful or curious, noted in the Marginal Column. Hence the Analysis of each Substance is deducible, and its due station in the general arrangement, ascertained with a degree of precision, which can seldom be effected from the mere circumstances of figure, texture, colour, &c. in the natural state; some kinds bearing a strong similitude to others, to which they are but little, perhaps not at all allied.

A GREAT variety of the most useful, as well as most entertaining PROCESSES, or OPERATIONS on Mineral Bodies, as well on the large, as on the small scale, dispersed throughout, will, I presume, render the work a valuable acquisition, as well to those who derive benefit from the application of this Science, to particular Arts or Purposes, as to those who study it for the improvement of Knowledge, or for Amusement only. The CHEMIST, whether philosophic, or practical; the ARTIST, in almost every branch of Manufacture, will profit by it in a greater or lesser degree; to the intelligent it will be of use, readily to refresh the Memory, preclude the necessity of rummaging through many Volumes, and perhaps sometimes, by furnishing new information; the less intelligent will be instructed by a methodical elucidation of each Subject, and by the variety of Processes. To the GENTLEMAN possessed of landed property, it must be peculiarly interesting, as it may lead him to the discovery of Ores, or other Minerals, in the Bowels of his Estate, more valuable, perhaps, than the Soil; instruct him in their management, through all the different operations employed upon them to render them beneficial, from their most crude to their purest State; and explain their application and uses. And to the TRAVELLER, or VIRTUOSO, diligent in searching for, and collecting rare and curious Specimens, it will prove a useful Assistant, by readily distinguishing the proper place of each Article in his Cabinet.

As it was impossible to find room for the acknowledgment of the several Authors to whom this Compilation is indebted, I have judged it least exceptionable to omit their names generally: relying upon the justice of my Readers, that they will not suspect me of the folly of making a bad Selection, when it was in my option to choose the best. I shall therefore only say, that I have consulted all the most approved Modern Writers, from whom I might expect to derive information on the subject: [it will appear to the intelligent Reader, that I have gleaned from several of them]; and that I have followed the classification of HYACINTH MAGELLAN's last Edition of CRONSTEDT'S SYSTEM of MINERALOGY.

I HAVE, however, been intimidated from introducing into this Work, any illucidations taken from the ANTIPHLOGISTIC PHILOSOPHY, so ably maintained by some of the most eminent Chemists of this enlightened Age; because this new System is far from being universally adopted, and is opposed with Arguments not less powerful than those adduced to defend it, and by Men of no less fame in the literary World.

It is unnecessary to explain the Plan of such a performance as this, which will be best understood by inspection.

To confine so extensive an Arrangement, as the Subject required, within reasonable Limits, it has been necessary to use much art: hence proceeds the encroachment of one column upon another, in some places, but never so as to create confusion; and hence, also, the general use of Abridgments, which, however, it will not be difficult to understand.

The number of great, and of SCIENTIFIC NAMES, which appear in my LIST of SUBSCRIBERS, stamps a Value upon the Synopsis, very flattering to me. It has been submitted to the examination of several of the most eminent of the latter description; and it is by their encouragement, all concurring in the opinion of its general utility, that I am induced to offer to the Publick, what I had originally undertaken for my own use and amusement.

JAMES MILLER.

Soluble in Nitrous, or in dephlogisticated Marine Acid, and in Aqua Regia; and precipitable in some degree by Caustic, and (Platina excepted) by Prussian Alkali. Communicate some Tinge to Borax and Microcosmic Salt, or render them opaque. And are all Conductors of Electricity; and more perfectly so than other Bodies, whilst united with Phlogiston.

Qualities and Application.		Sp.Gr.	Affinities.		Texture.		Colour.	Contents.	
The heaviest, and most fluid of S. Metals. Yields under the Hammer, though brittle. Resembles Lead.		9.600 to 9.700	HEAT—melts and calcines it, with an encrease of $\frac{1}{4}$ an Ounce to the Pound; and with more ease than it does Lead, qualifying it to work on the Cupel; and volatilizes it. The Calx is melted into a brownish Yellow Glafs which promotes the vitrification of refractory Ores; is more corrosive than Glafs of Lead; and, when it ceases to fume, becomes fixed.		Solid. Lamellated, the Shining Plates.		Plates larger than those of Reg. of Ant. or Zinc.	Whitish-Yel. or Ash coloured.	BISMUTH, or TIN GLASS.
(a) Mixed with different Metals makes Pewter, Solder for Lead or Tin, Printing Types, Collars for nice Axes, &c. is preferable to Lead for cupellation, and scorification of Metals.			During fusion, the Volume occupies less Space than before: A property peculiar to Bism. amongst S. Metals. Long reverberated a part is revived by the Flame; being the easiest to revive of all the deffructable metallic Bodies. Heat vitiifies the Ore of a beautiful (1) Blue Colour; which has created a doubt whether it is not a Species of Cobalt Ore? Gradually cooled it crystallizes.						(a) Pewter, Solder. Printing Types, Collars.
(b) Iron is silvered (in appearance) being coated with its Amalg. and exposed to heat to volatilize the Merc.			METAL. SUBSTANCES—GOLD or SILVER being united with it, a heat sufficient to melt the Mixture vitrifies the Bism.; (2) separates it from those Metals, with which it has no affinity; and glazes the vessel with it: Sulp. being added, all unite in a brittle compound, of the appearance of Ore. COPPER melts with it readily, but Sulp. added, has a like appearance. LEAD joined to the Mixture, the Copper and Sulp. unite in Scorize like Ore, and the Bism. and Lead form a Regulus. ZINC cannot be united with it simply; but 3 Parts Zinc mixed with 5 Lead, will form with 3 Bism. a (3) Compound which melts in a degree of heat less than that in which Water boils. MERC. (4) amalgamates with it; retains its fluidity if the proportion is equal; and some Metals, particularly Lead, being mixed with the Amalg. are so attenuated as to pass with it through the Leather: Equal Parts Bism. and Lead with $\frac{1}{4}$ Merc. heated together, becomes a hard (5) Mass when cold, but fluid again, put in boiling Water.						(b) Iron Silvered.
(c) Wood silvered also, by the powder of Bism. applied on it with the Whites of Eggs.			ACID-VIT.—requires to be boiled to dryness nearly, to act upon it. NIT. produces Quadrilat. Pyraml. Crystals; Water being added, to the Sol. precipitates a (6) Calx. (by which Criterion it is distinguished from other Metals) of a pure White colour, which becomes yellowish, and even black if attacked by sulphureous Vapours, or odororous emanations. MUR.—dissolves its Calx only. AQ. REG.—most perfectly dissolves it, of a red Colour. VEG.—slowly, producing a styptic Solution. ALK. precipitates the Calces, but not so beautiful a White colour.						(c) Wood Silver ed.
(d) Bottles are foiled within side by a mixture of Lead, Tin, Merc. and Bismuth.			HEAT—of a Candle melts it; hence it is distinguished and separated from Cobalt. ACID-NIT—dissolves it; and Water added precipitates it from any other Metal.						(d) Bottles foiled.
(e) Green Sympathetic Ink—The Sol. of 1 part Bismuth in 2 $\frac{1}{2}$ Aq. Fort. poured on Com. Salt, and distilled, leaves a Salt, blue whilst warm, but which turns red: this, dissolved in Water, precipitates a white insoluble sediment. The Liquor is the Ink, which produces Characters of a red colour that soon disappear; are restored green by warming; vanish again; and may be recovered again at pleasure.			ACID-NIT.—separates the Bism. from other Metals, precipitating the Sol. with Water.						(e) Green Sympathetic Ink
Bismuth detected—Add Water to a Sol. of the suspected Ore in Nit. Acid; if any precipitate follows it is Bismuth.			HEAT—readily melts it; the Sulp. separating in the scorification.						(1) Small of Bismuth.
The most common of all the native Metallic Substances.			ACID-NIT.—dissolves it partially, without effervescence. This Sol. makes Symp. Ink.						(2) Gold purified.
Calcareous Found mixed with Calc. Ores.			HEAT—in a lower deg. than is necessary to melt Copper or Silver, but in a higher than is required for Lead or Tin, melts Zinc. The Bars present Facets in their fracture, consisting of 4 ang. blue Prisms, which tarnish in the Air. In the greatest degree below fusion the Metal is so brittle as to be easily pulverized; in this differing from Metals, which become more ductile under such circumstances. In a glowing deg. of heat it inflames with changeable colours, Blue and Yellow, and intense light. In an open Fire the Calx rises in form of soft (1) white Flowers, so fixed as not to admit of reduction, even by the addition of Phlogiston: contrary to the nature of all other Metals and S. Metals: and, in large Works, the volatilized Zinc adheres to the Sides of the Furnace, in a (2) White Calx. In close Vessels, united with Phlog., it is distilled in a Metal form; a part vitrifying.						(3) Chemical Bullets.
Refembles Galena, but is heavier.			ACID-NIT.—dissolves it partially, without effervescence. This Sol. makes Symp. Ink.						(4) Merc. adulterated.
Yields a radicated Regulus.			HEAT—readily melts it; the Sulp. separating in the scorification.						(5) Anatomical Injection.
Fetid when rubbed.—Some strike Fire with Steel.			ACID-NIT.—dissolves it partially, without effervescence. This Sol. makes Symp. Ink.						(6) Magifery of Bism.
The most malleable of S. Metals. Little subject to tarnish. Not reducible to Powder under the Hammer. And the only Substance which can give to Copper a Yellow col.		6.900 to 7.240	HEAT—in a lower deg. than is necessary to melt Copper or Silver, but in a higher than is required for Lead or Tin, melts Zinc. The Bars present Facets in their fracture, consisting of 4 ang. blue Prisms, which tarnish in the Air. In the greatest degree below fusion the Metal is so brittle as to be easily pulverized; in this differing from Metals, which become more ductile under such circumstances. In a glowing deg. of heat it inflames with changeable colours, Blue and Yellow, and intense light. In an open Fire the Calx rises in form of soft (1) white Flowers, so fixed as not to admit of reduction, even by the addition of Phlogiston: contrary to the nature of all other Metals and S. Metals: and, in large Works, the volatilized Zinc adheres to the Sides of the Furnace, in a (2) White Calx. In close Vessels, united with Phlog., it is distilled in a Metal form; a part vitrifying.						(1) Spanish White, or Pearl Powder.
(a) It is employed by the Chinese in the illuminating Matter of their Bacons; as producing intense Light and peculiar variegated Colours, White, Yellow, Blue.			METALS—all unite with it (except BISM. and NICKEL, on which it floats,) and the Compound is volatile. GOLD is debased by it, the parts of Zinc destroying its malleability: mixed in equal parts makes a hard (3) White Metal, not subject to tarnish, and therefore recommended for Specula. LEAD and TIN—are improved in colour and lustre by it; and rendered firmer. The Lead bears equal parts Zinc without losing too much of its malleability. COPPER combined with Zinc or its Vapour, is exalted to a (4) Gold colour, even $\frac{1}{2}$ does not destroy its ductility. IRON—unites with it, sometimes requiring the addition of Sulphur to promote the fusion, and its colour is brightened almost to a (5) Silver Hue. MERC.—amalgamates with it readily than with Copper, (6) from which the Zinc will separate the Merc. ANTIM.—crude—does not unite with it. ARSENIC—which whitens all other Metals renders this black and friable. Mixed together in close Vessels a pleasant aromatic Odour ensues on opening the Vessel. NITRE—(7) deflagrates with Zinc heated to a certain degree without inflammation.						(1) Smalt of Bismuth.
(b) Is used in compositions for Fireworks, on the same account. Zinc Powder cast through the blaze of a candle, inflames and exhibits the same Colours.			ACIDS.—It shews a greater attachment to than any other Metals do, except Iron. VIT.—it has the strongest attraction for of any, in consequence of the Zinc abounding so much in Phlog. but the Acid requires to be diluted. During the solution with this, or the Mur. Acid, a (8) Gas is discharged, $\frac{2}{3}$ lighter than Com. Air, more abundantly than with the Sol. of Iron. This Inflam. Air is subject to explosion, and leaves behind a small quantity of White Matter. The Sol. yields (9) White 4 Ang. Prism. Crystals. NIT.—produces elastic corrosive Vapours, and a boiling heat. MUR.—excites the most violent Flame, as acting but little on the Phlog. VEG.—unites with it, forming Styptic Mixtures.						(2) Gold purified.
(c) Prince's Met.—Pinchbeck, &c.—are made in the same manner as Brads (see Cop.) only varying in the proportions. With a small prop. of Calam. the Cop. becomes pale, increased to $\frac{1}{2}$ inclines to Yellow, which improves towards a gold col. as it approaches $\frac{1}{2}$; but still encreased, the Metal becomes more and more pale; and at length White.			PHLOG.—abounds in its composition, causing its ready inflammation like an oily Substance. Hence SULPHUR—or CRUDE ANT. containing much Sulphur, which scorify all other Metals except Gold and Platina; or the composition of Sulp. and fixed Alk. which dissolves even Gold; are incapable of uniting with Zinc; (10) which may therefore be freed from Lead by injecting Sulphur on the compound in fusion; the Sulp. will absorb the Lead, and the concrete swim on the Surface. But Sulp. combines with its Calx into a kind of Blende.						(3) Chemical Bullets.
(d) Or de Manheim—To									

